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EQUIPMENT • FOR • PRODUCTION • SERVICE • MAINTENANCE

AUTOMOTIVE INDUSTRIES

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What the Industry Thinks About "F.O.B.-Mill" Steel

Swimming Tank, Swamp Skipper and Other New U.S. Military Vehicles

Packard's New Gas Turbine Research Plant

One Hundred Million Vehicles in Fifty-five Years

1½ Million Bearings a Month by New Departure at Sandusky

Short Run Dies of Wood, Glass, and Concrete

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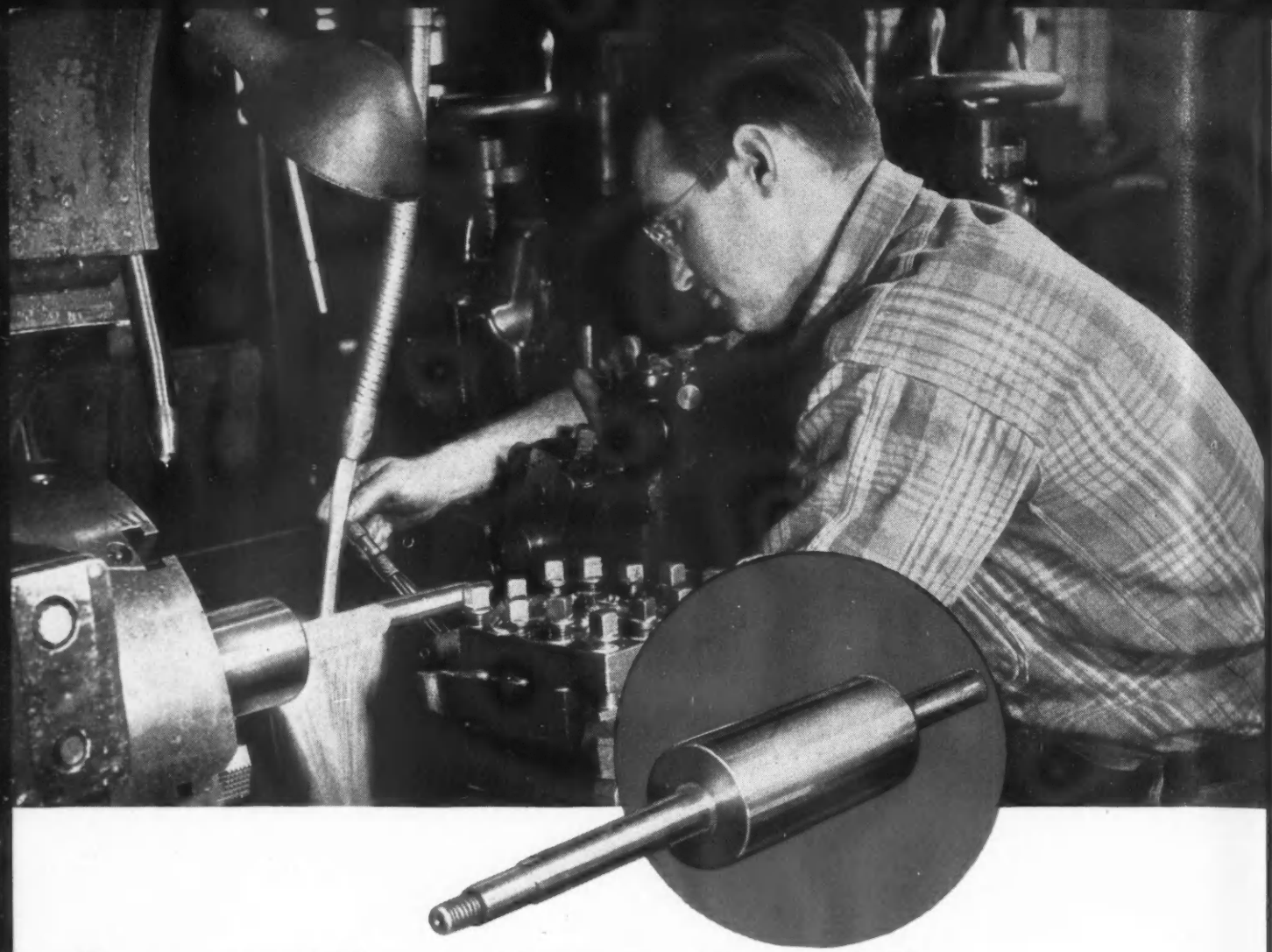

Gets cutting-oil results with soluble oil economy

Are you looking for a soluble oil that will handle more of your cutting operations . . . reduce costly use of special cutting oils? Here's evidence that Stanicool HD Soluble Oil will give you just such versatile service.

The spindle shown above was machined from 1035 hot-rolled steel. The job required a cut 10 inches long and 1¼ inches deep.

For this heavy job a special cutting oil was used, although Stanicool HD Soluble Oil was giving satisfactory service on several other operations. In an attempt to reduce costs, Stanicool HD was tested for machining this spindle. It worked! Spindle production was equal to that obtained with the special cutting oil. Finish was highly satisfactory, tool life excellent. Because of its composition, Stanicool HD can handle a wider variety of your machine operations than conventional soluble oils. A Standard Cutting Oil Specialist is available to help you obtain the most economical use of Stanicool HD. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Stanicool HD Soluble Oil

Machinery manufacturers Claude Goulding (left) and James Goulding (right) examine one of the spindles produced on the turning operation above. They are especially pleased with the advantages of using Stanicool HD Soluble Oil on this job.

STANDARD OIL COMPANY (INDIANA)

STANDARD

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

August 1, 1948 Vol. 99, No. 3

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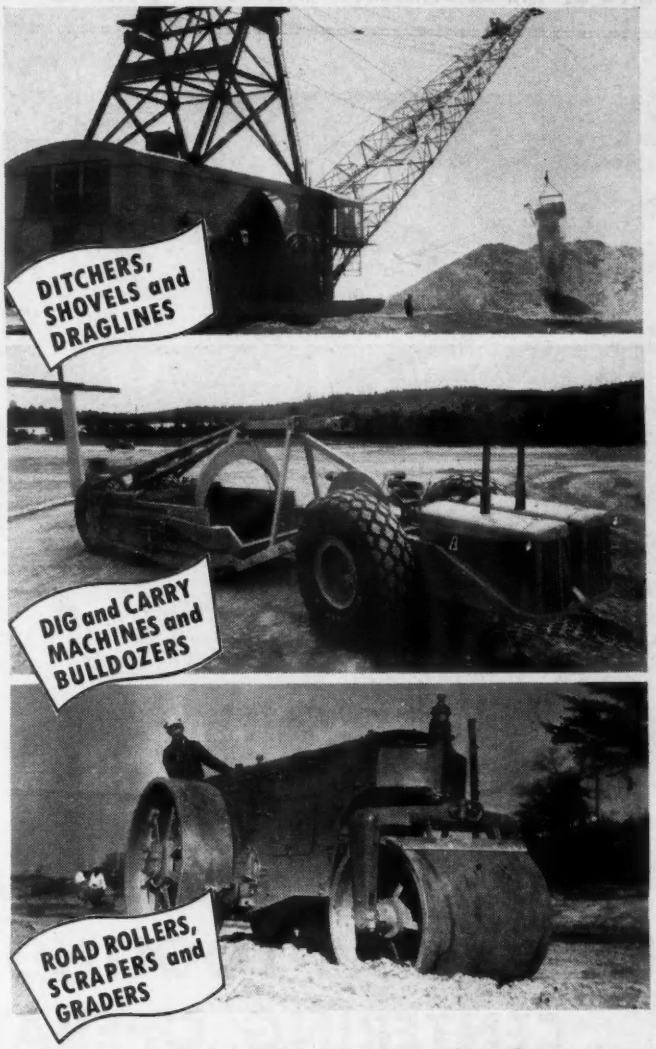
YOUNG Equipment Cools GIANT EARTH MOVERS



Large capacity, efficient heat transfer, and sturdy construction are features of Young automotive cooling systems. Manufacturers of mammoth earth moving and road building machinery, like that shown above, know that Young-engineered equipment is designed to maintain optimum engine temperatures under the most strenuous duty, and is built to provide long-lasting, economical service.

SEND FOR NEW CATALOG

Young's entire line of Heat Transfer Products is illustrated in the colorful, new General Catalog No. 148. Your written request will bring a copy promptly. Detailed information about any Young product is available without obligation.

YOUNG HEAT TRANSFER PRODUCTS

YOUNG RADIATOR CO.
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Sales and Engineering Offices in All Principal Cities

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Gas, gasoline, Diesel engine cooling, radiators • Jacket water coolers • Heat exchangers • Intercoolers • Condensers • Evaporating coolers • Oil coolers • Gas coolers • Atmospheric cooling and condensing units • Supercharger intercoolers • Aircraft heat transfer equipment

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Convectors • Unit Heaters • Heating coils • Cooling coils • Evaporators • Air conditioning units •

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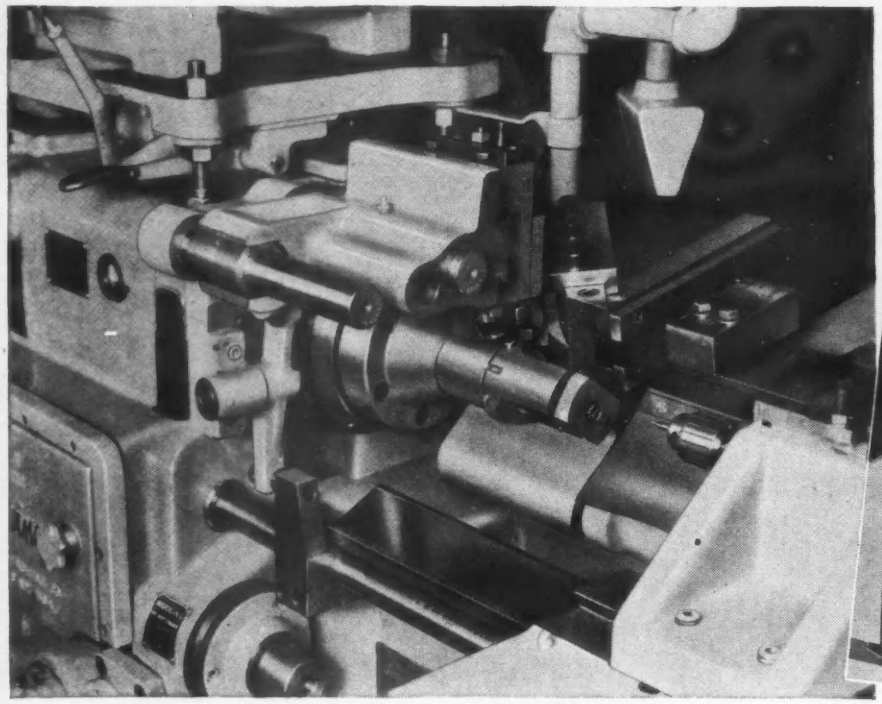
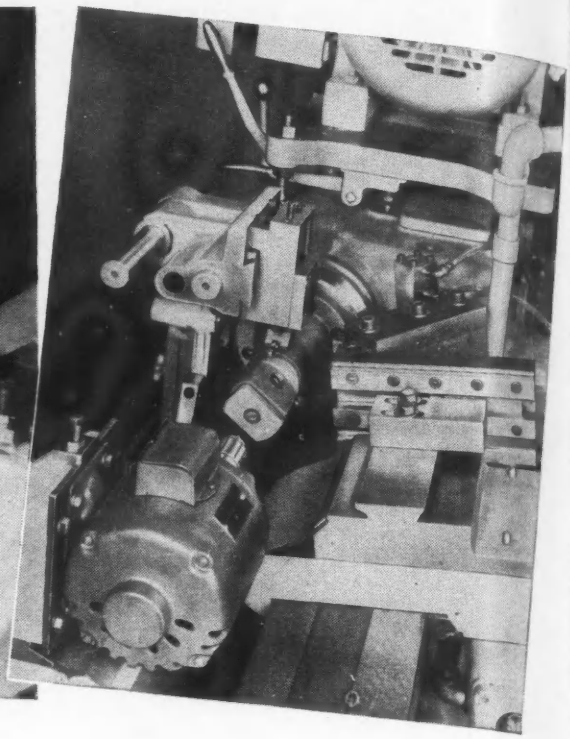
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE *Lo-swing* PEOPLE"** SENECA FALLS, NEW YORK





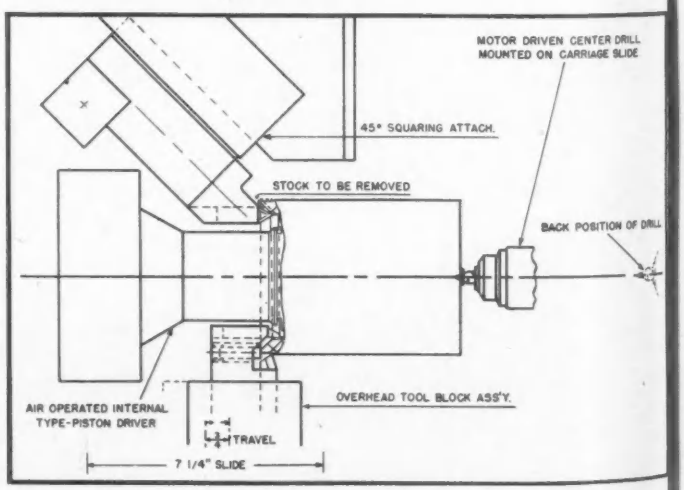
MODEL "LR" AUTOMATIC *Lo-swing* LATHE with SPECIAL TOOLING for FAST BORING and CENTERING OPERATIONS on PISTONS

Problem: To bore, chamfer, face and turn skirt of piston and center closed end true with rough bore.

Solution: The Model "LR" Automatic Lo-swing Lathe selected was equipped with the special tooling shown in the close-up views above and in the line drawing.

The air operated centering arbor is fitted with a spring loaded centering plate which centers the piston from the bottom of the bore, while three air operated jaws center the open end. The piston is held back against the centering plate by an air operated pull bar and by a pin introduced thru the gudgeon pin hole. After the piston is clamped in position, the boring, turning and facing of the open end of the skirt is machined with tools mounted on the overhead slide. Simultaneously the chamfering operation is made with a 45° squaring attachment, mounted on the rear of the lathe. The centering of the closed end is accomplished with an electrically-operated centering head. All tools operate simultaneously and a high hourly production is obtained. The operation is entirely automatic, the operator simply loading and unloading the parts.

Consult our Engineering Department for Automatic Lo-swing Lathe with tooling engineered for your particular machining problems.


MOTOR DRIVEN CENTER DRILL MOUNTED ON CARRIAGE SLIDE
45° SQUARING ATTACH.
STOCK TO BE REMOVED
BACK POSITION OF DRILL
AIR OPERATED INTERNAL TYPE-PISTON DRIVER
OVERHEAD TOOL BLOCK ASS'Y.
TRAVEL
7 1/4" SLIDE

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

The Industry's Views on "F.O.B. Mill Steel"

Abandonment of the basing point system by the steel industry is calculated to work great mischief to the entire economy. Resultant higher prices for steel—for cars and for trucks—and the possible moves of both automobile and steel men in the face of them, are thoughtfully analyzed on page 25.

Million and a Half Automotive Bearings a Month

The manufacture of bearings involves more meticulous attention to dimensional tolerances and quality control than anything else going into a motor vehicle. Here is an excellent account of the high production set-up in the famous Sandusky Ball Bearing Plant of the New Departure Co. Turn to page 26.

Twin-Engined Bus with Rubber-Air Suspension

Greyhound's new experimental inter-city bus incorporates these two engineering developments to eliminate road delays due to engine failure and to improve operating efficiency. The chief engineer of the Greyhound Corp. presents these developments as described at the SAE 1948 summer meeting. See page 32.

Uncle Sam's Newest

Accomplishments in developing transport and tactical vehicles at the Army Ordnance tank-automotive center, Detroit Arsenal, are amply set forth in this article. Information on the swimming tank, swamp skipper and other military vehicles will be found on page 36.

Short Run Dies of Wood, Glass and Concrete

This article describes the practices of one company effecting great savings in original die-making costs through the manufacture of dies of concrete-and-glass for body panels. It begins on page 46.

22 New Product Items And Other High Spots, Such As:

Design progress in American passenger cars; the latest transfer machines in use at the Ford plant; lifting the lid on secrecy concerning the Packard gas turbine research plant; two lightweight Indian motorcycles; and a new hydraulic pump with rotary type pistons.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

ON THIS HYDRO-BROACH

Clamping and Safety are Automatic

AND PRODUCTION EXCEEDS 400 HOUSINGS PER HOUR

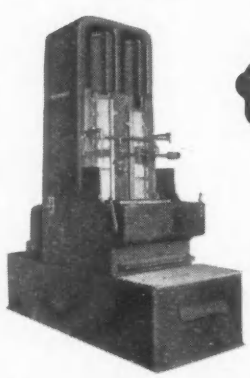
Close-up of fixtures, clamping bridle and broaching inserts devised by Cincinnati Application Engineers to broach the cover face of washing machine power housings. Foreground fixture is empty. The machine: CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach.

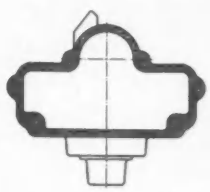
High production workers—and machines, too—need adequate safeguards. That's why Cincinnati Application Engineers included automatic clamping and safety features with the equipment above which they devised for broaching the cover face of washing machine power housings. ¶ To reduce operator fatigue and assure uniform clamping at just the right pressure (notice that the parts are rather frail) spring loaded rollers in a bridle above the fixtures actuate the clamps with the swiveling motion of the table. To safeguard the operator and prevent wrecks, the table cannot swivel to broaching position until the manually operated fixture levers close the clamps.

These automatic features, coupled with the well-designed broaching inserts and CINCINNATI Hydro-Broach's smooth cutting action, enable the operator to average 433 parts per hour. High production or medium production, Cincinnati engineered equipment on CINCINNATI Hydro-Broach Machines will give you lowest cost per surface broaching operation. Our engineers are at your service. May we hear from you? Please include blueprint of part and all related information.

Drawing of part. Broached surface shown in color.

Part Name.....Power housing
Material.....Cast iron
Stock removal.....⅛" max.
Operation.....Broach cover face
Production.....433 per hour
Machine.....CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach





CINCINNATI Duplex Vertical Hydro-Broach. Complete specifications may be obtained by writing for catalog M-1387-2.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

NEWS of the AUTOMOTIVE INDUSTRIES

Vol. 99, No. 3 August 1, 1948

Independents Boost Output in First Half of '48

The smaller independent automobile makers are apparently faring better than their larger competitors during the current steel shortage. Studebaker built more cars and trucks during the first six months of this year than in any other similar period of its history. According to H. S. Vance, president, 115,211 units were produced from Jan. 1 to June 30 in the company's South Bend and Los Angeles plants. During June, Packard hit a new postwar high with the production of 10,126 cars. During the first six months of this year Packard produced 46,200 units, compared with 55,477 for all of 1947. Studebaker purchased a steel mill several months ago, and Packard, through a financial arrangement, is assured a specified amount of steel from a mill at Wilders, Ky.

TELEVISION TRANSPORT

Rushed to completion for the American Broadcasting Co., and its key station WJZ-TV, this Chevrolet truck with a special Grumman body carried television equipment into the center of action at the Democratic national convention in Philadelphia.

K-F to Produce 1949 Models in Fall

The Kaiser-Frazer Corp. is moving ahead rapidly on its 1949 models which probably will get into production in September or October. No details are available as yet, but it is understood that the cars have been moderately restyled and that riding qualities have been further improved. The new hard-top convertible, which K-F has under development, will probably not be announced until after the regular models are introduced. K-F is also reported working on several improved versions of engines which probably will not be introduced until 1950 or later.

GM Made Over 1 Million Units in First Half of '48

Although GM during the first six months of this year fell more than 400,000 units behind its 1941 first-half production, it did not fare too badly compared with the first six months of 1940. During the first half of 1948, GM built a total of 1,062,359 cars, trucks, and buses against 1,495,208 during the first half of 1941. However, during the first six months of 1940 total production was 1,142,830 units, only 80,000 more than were built this year during the same period. Actually when it is considered that cars being built today are larger and heavier, and repair parts volume is much greater, the total amount of materials involved during the first half of this year was probably greater than was required in 1940 for a larger number of units. Also included in the 1940 and 1941 figures were trucks produced for the armed services.

Buick Opens New Factory Branch in Detroit

GM's Buick Motor Div. has opened one new factory branch in Detroit and will soon open another. The new units are to replace two large Buick dealerships which have lost their franchises.

Hudson Convertible Delayed by Tool & Die Strike

The new Hudson convertible model originally scheduled for production in July has been delayed by the tool and die strike in Detroit. While no details are as yet available, the car is said to have a unique framing construction somewhat similar to the unit frame design used on other Hudson models. In connection with the tool and die strike, one independent manufacturer narrowly missed being put out of production. An important set of body dies had been placed in a tool and die shop for modifications. When the strike hit, the work had not yet been completed, but owners of the shop, who were skilled craftsmen, finished the work over the protests of the union.

Nash Making Some New Trucks for Export

Although Nash Motors still appears to be many months away from production on its new truck line, the company is building a few units each month for export sales. Trucks are stripped-down chassis without fenders or cab. Meanwhile, the company is using several of the trucks on its body hauling between Milwaukee and Kenosha, Wisc.

NEWS *of the* AUTOMOTIVE INDUSTRIES

K-F & Packard Fly Car Buyers to Factory

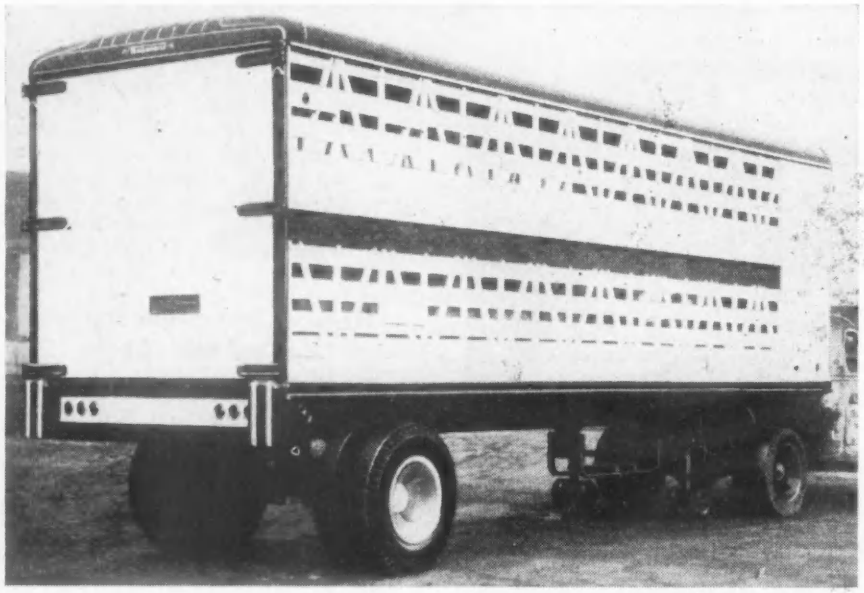
The Kaiser-Frazer Corp. and the Packard Motor Car Co. have completed arrangements with the United Airlines to fly prospective customers to the factory to take delivery of new automobiles. The airline points out that buyers have an opportunity to see cars being built on the production line, and can also break in their cars on the trip home. It states too that savings in freight in handling charges in many cases are enough to cover the entire expense of the trip. K-F has been particularly active in promoting customer driveaways, and has built a unique customer service building especially for visitors taking delivery at the plant. Being located right at the Willow Run airport, K-F is strategically located for the airline deal.

Ford Gets Isotopes for Research

The Ford Motor Co. is believed to be the first automobile company to receive a shipment of radioactive isotopes to be used in experimental research. The applied physics department will conduct the research and hopes eventually to develop methods for using isotopes for gaging metal in the rolling mill, determining the steel-slag line in cupolas, and possibly for instrumentation.

Survey Shows Taxicab Distribution

According to a survey made by the International City Managers Association, more than 70,000 taxicabs are operating in all cities of more than 10,000 population in the United States. The survey covered 834 cities and showed an average of 1.17 cabs per 1000 population for the entire group. Highest ratio of cabs to population is in cities of 10,000 to 25,000, with 1.42 cabs per 1000 persons. Smallest number of cabs per capita was found to be in cities of 250,000 to 500,000 population with .87 cabs per 1000 residents. New York City was found to have nearly 20 per cent of all the cabs in all the cities of more than 10,000, with 11,814 cabs registered. Following in order were Chicago, 3275; Philadelphia, 1800; Boston, 1525; Detroit, 1302; Baltimore, 1150; Los Angeles, 1064; St. Louis, 950; Pittsburgh, 780, and San Francisco, 729.



LIVE TRANSPORT

One of the latest farm trailers produced by the Trailmobile Co., Cincinnati, O., is the new Trailmobile deluxe cattle rack trailer shown above. It is equipped to transport not only cattle, but hogs or sheep as well, in quantity lots.

Tucker Closes Offices In Canada

The Tucker Corp. has closed the offices of Tucker Corp. of Canada, Ltd. at Toronto. The company spokesman said that the move was made because of excessive taxes on the importation of automobiles. He added that the company has returned $8000 paid for Tucker franchises, and that the office will stay closed until the Canadian government modifies its import regulations on complete automobiles. Another report on Tucker is that the company is negotiating for additional capital, but details of what avenue the company is exploring have not yet been revealed. Operations at the Chicago plant were closed July 1 while the SEC was examining the records. Meanwhile, Tucker has appointed Dan Lebeau as general production manager to succeed Lee Treese, who has been made vice president of production and a member of the board of directors. Mr. Lebeau was formerly with Ypsilanti Tool & Machine Co., which is controlled by the Tucker family.

Move Stinson Div. to San Diego, Calif.

Detroit, heavily involved in aircraft production during the war, no longer has a single aircraft factory left. The Stinson Div., Consolidated Vultee Aircraft Corp. has been moved from its location at Wayne, Mich., just outside Detroit, to San Diego, Calif. The Stinson company was founded 22 years ago by the late Edward A. Stinson. During recent months the company had been producing four-place personal planes at the rate of one every hour and 18 minutes.

Oldsmobile Order Backlog Up Over a 1000 a Day

The rise in unfilled automobile orders continues its phenomenal climb. S. E. Skinner, general manager of GM's Oldsmobile Div. reports that the backlog of unfilled orders is increasing at the rate of more than 1000 units a day. He said that unfilled orders at the first of July totaled 515,000 for all models, and are increasing twice as fast as deliveries can be made. He added that 92 per cent of the Oldsmobiles that leave the factory are equipped with Hydra-Matic Drive. More than 521,000 Oldsmobiles have been equipped with Hydra-Matic since it was introduced in 1939.

Willys to be Distributor For California

Willys-Overland Motors will assume sole distributorship rights for Willys products in California effective Oct. 1. Until that time the Transport Motor Co. will continue as distributor in that state. The company says that in all other parts of the country Willys will continue selling through distributors, of which it has about 100, to service 2400 dealers.

Murray Corp. Reveals Trend to Diversification

The nine months stockholders statement by the Murray Corp. of America carries an interesting comment showing the trend toward diversification among independent automobile body manufacturers. C. W. Avery, president, stated that initial production on new models in the automobile industry has always been very costly, and that during the quarter just past, the introduction of new models has replaced every product of Murray's Body Div. In the past such a change has been reflected in a company-wide net loss for the period involved, but for the first time, however, Mr. Avery said that this starting load has been offset by profits from other divisions, and that the effectiveness of the long range diversification program has been proven. The introduction of new models referred to involves the changeover by Ford Motor Co. which is a large customer of Murray.

Rearmament Not to Affect Car Steel Supply

The automobile industry does not expect the military defense program to have any material effect on steel supply this year, barring a sudden military crisis. It is believed that in the normal course of events it would take several months to complete the design of new combat vehicles and other military equipment, and to tool up for any sizable production. Meanwhile, President Truman has asked the Secretary of Commerce to set up a voluntary steel allocation system for military needs. Under the provisions of the Draft Act passed by Congress, the President is empowered to set up compulsory steel priorities and steel allocations, but is reported to favor a voluntary system. Reports from the steel industry say that total tonnage of hot and cold rolled steel this year will probably exceed the 1947 output by about 1.5 million tons with the automobile industry getting its share. Consequently, the outlook for the rest of this year is more favorable than for the first half, although the month of July was marred by nuisance strikes among suppliers which undoubtedly lowered the month's total. Most bothersome strikes were at Campbell Wyant & Cannon, which supplies cylinder blocks to Ford, Lincoln, Hudson and Reo, and the Timken-Axle strike which affects every major producer of heavy and medium duty trucks. It is believed, however, that the labor situation will straighten out in August, and that production from then to the end of the year should be on a fairly high level bringing the 1948 total to somewhere between 5,250,000 and 5.5 million units.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the Five Months' 1948 Totals

Make	May*	April	March	February	January	Five Months 1948	Five Months 1947
Chevrolet	50,192	71,184	66,465	53,411	55,090	289,804	248,007
Ford	5,566	23,864	42,405	42,650	44,896	155,010	203,741
Plymouth	24,082	35,598	29,364	21,433	30,311	137,432	125,844
Buick	17,200	24,823	24,726	20,001	18,073	102,312	91,201
Pontiac	16,445	24,187	23,470	18,148	16,428	95,840	80,997
Oldsmobile	13,429	19,197	18,377	12,484	12,148	73,796	72,875
Studebaker	10,603	13,535	13,434	10,367	10,211	56,238	40,557
Nash	10,336	12,653	10,490	8,227	8,469	48,758	44,767
Hudson	9,944	12,069	10,967	6,907	6,595	44,937	39,834
Chrysler	8,699	12,512	8,997	6,188	8,621	43,776	35,939
Kaiser	10,433	12,152	7,795	6,501	7,410	43,029	14,736
Mercury	7,443	3,910	8,454	9,321	10,110	38,243	43,969
DeSoto	6,184	9,600	6,945	4,710	6,946	33,094	27,243
Frazer	6,984	7,417	4,657	4,555	5,443	28,223	9,669
Packard	7,496	8,103	5,884	3,549	4,152	28,104	16,860
Cadillac	5,164	6,434	3,665	1,801	4,351	20,861	20,079
Willys	2,292	3,143	2,821	1,845	1,886	11,697	8,932
Crosley	2,701	2,988	1,965	1,401	1,449	10,054	5,840
Lincoln	2,542	1,231	1,133	1,238	1,728	7,589	9,455
Austin	870	1,124	803	457	239	3,334	.....
British Ford	98	1	.....	.....	.....	99	.....
Playboy	5	5	1	2	.....	13	.....
Tucker	1	.....	.....	.....	.....	1	.....
All Others	482	493	233	105	87	1,295	317
Total	234,637	330,555	311,650	249,781	274,978	1,364,201	1,219,407

* Data from R. L. Polk & Co.

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to Five Months' 1948 Totals

Make	May*	April	March	February	January	Five Months 1948	Five Months 1947
Chevrolet	26,607	28,579	26,812	21,530	23,121	124,885	93,127
Ford	24,510	28,411	20,662	14,502	7,573	93,430	82,893
International	11,725	13,427	12,840	10,007	10,250	57,488	43,976
Dodge	10,153	11,925	11,606	9,263	7,426	49,410	52,140
G.M.C.	5,381	6,603	5,949	4,806	5,640	27,772	21,727
Willys-Jeep	4,533	4,964	4,036	3,522	3,875	20,746	15,660
Studebaker	2,789	4,771	4,732	3,934	3,990	19,683	16,406
Willys-Truck	2,552	2,880	1,894	1,289	1,174	9,582	.....
Reo	1,117	1,058	1,076	919	1,143	5,284	5,988
White	1,084	1,184	1,088	965	1,023	5,275	5,434
Diamond T	1,009	1,138	939	802	808	4,641	4,126
Mack	911	941	920	817	1,071	4,636	3,872
Divco	567	527	517	463	574	2,644	1,851
Federal	462	494	509	398	413	2,269	2,250
Brockway	234	296	328	259	362	1,479	1,854
Autocar	209	240	216	244	329	1,235	1,988
Crosley	264	312	249	173	159	1,112	.....
F.W.D.	39	47	67	93	107	352	511
Ward La France	33	31	38	45	45	192	249
Sterling	22	78	49	30	27	185	213
Kenworth	37	25	33	26	39	157	.....
Oshkosh	7	34	15	22	36	114	104
Hudson	11	15	24	22	36	107	1,460
Nash	1	2	4	.....	2	9	.....
All Others	119	186	203	195	263	945	1,142
Total	94,376	108,168	94,806	78,326	69,486	433,632	356,971

*—Data from R. L. Polk & Co. and are complete for all states for all months with the exception of California for May.

NEWS *of the* AUTOMOTIVE INDUSTRIES

CANADIAN METEOR

Replacing the Mercury 114, the new Meteor has been introduced for the Canadian low price field by the Mercury and Lincoln Div. of the Ford Motor Co. of Canada, Ltd. The new car is essentially a 1949 Ford with styling changes in the hood ornament and grille.

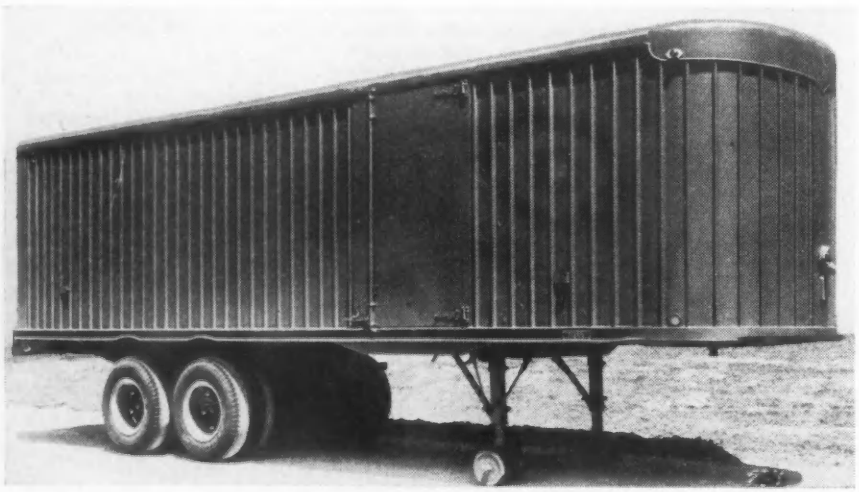
Texaco Expanding Research Labs in Beacon, N. Y.

The construction of three new buildings in Beacon, N. Y. will provide a 40 per cent boost in current facilities at the Texas Co.'s research laboratories in that city, according to Dr. W. E. Kuhn, manager of Texaco's Technical and Research Div. A new engineering building will contain laboratories for volatility, lubrication and combustion studies. A chemistry building will contain 18 entire laboratories for the further development of new lubricants, and the third new building will provide office space and required services. With the schedule calling for completion within one year, the new buildings will provide 55,000 sq ft of additional floor space.

American Bantam Gets Newgren Co.

The American Bantam Car Co. has bought the Newgren Co. of Toledo, O., a subsidiary of the Monroe Auto Equipment Co., Monroe, Mich., and Monroe officials will assume active management .of American Bantam. The Newgren Co. engineers, develops and sells specialized farm equipment for use as attachments to the Willys-Overland Jeep. American Bantam will continue to manufacture cargo trailers, while using excess manufacturing capacity for the production of many Newgren products, and possibly some Monroe products.

Brouwer D. McIntyre, president and general manager of Monroe, William D. McIntyre, executive vice-president and treasurer of Monroe, and Charles S. McIntyre, Monroe vice-president, secretary and general sales manager, were named directors of Bantam when the latter's shareholders voted to enlarge their board from eight to 11 members. By action of the board, Brouwer McIntyre was also elected president of Bantam, and William McIntyre was named executive vice-president of Bantam.



FRESH FROM FRUEHAUF

Now being made by the Fruehauf-Carter Div., Fruehauf Trailer Co., this new corrugated panel van trailer incorporates Fruehauf two-speed transmission supports, multiple-welded all-steel doors, and Fruehauf underconstruction. Either the Fruehauf Gravity Suspension Tandem or Fruehauf "Multi-Rate" single axle springs may be selected by buyers.

Parker Appliance Co. Buys Air Associates' Plant

The Los Angeles plant of Air Associates, Inc., Teterboro, N. J., has been bought by the Parker Appliance Co. The purchase price was reported to be over $300,000. Completed late in 1941, the single-story building covers about 42,000 sq ft of a five acre plot, and will double the manufacturing facilities of Parker Appliance's Pacific Div.

Automobile Congress Opens in Turin, Italy, Sept. 23

Promoted by the Federation Internationale des Ingeniurs et Techniciens de l'Automobile and by other institutions, the Second International Technical Congress will open on Sept. 23rd in Turin, Italy.

SAE West Coast Meeting in San Francisco, Aug. 18-20

Reporting findings and developments in fuels and lubricants, transportation and maintenace, truck and bus, diesel engine, and aeronautical engineering, 14 technical papers will be presented Aug. 18-20 at the National West Coast Meeting of the Society of Automotive Engineers, in San Francisco, Calif.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Completing First Wing of Ford Research Center

First announced by Henry Ford II, on June 4, 1946, plans for a large Ford Motor Co. Research and Engineering Center in Dearborn, Mich. are being realized. Harold T. Youngren, Ford engineering chief, said that construction is proceeding rapidly on the first wing in the T-shaped dynamometer building, the first unit of the center, with completion scheduled for early September. Described by architects as a most modern engine development and testing facility, the new dynamometer building's two wings will each contain 16 engine test cells. Overall size of the completed unit will be 450 ft by 350 ft.

Completely New Sunbeam 80 and 90 Models

Completely redesigned, the new British Sunbeam-Talbot 80 and 90 models are equipped with four-cyl, overhead-valve engines, bore and stroke, 2.48 x 3.74 and 2.95 x 4.33 in., (67 and 121 cu in.), respectively. The smaller of the two engines has a compression ratio of 6.88 to 1 and develops 47 hp at 4800 rpm, while the larger one has a ratio of 6.59 to 1 and develops 64 hp at 4100 rpm. Light alloy forged connecting rods are used on the 90 engine, with shell bearings and a full floating piston pin. The connecting rod bolts are swaged and fitted with an Allen keyway in the head. Lo-Ex alloy pistons are used on both models and have two compression and one scraper ring above the piston pin. A groove is cut on the skirt for an additional ring, if this should become necessary to prevent oil pumping. Both models have a single plate clutch and a four-speed, synchromatic transmission. The chassis is composed of box-section side members, with three box-section and one tubular cross member. Springs are semi-elliptic all around.

Body styles have been changed, and now include a four-door sports sedan, and a four-seater convertible coupe. The conventional radiator grille is retained. The front fenders, with recessed head-lights, merge into the sides of the hood, and the rear wheels are enclosed. With a wheelbase of 103½ in. for both models, the only dimensional differences are in the overall height. The smaller of the two models is listed at $2780 and larger at $3100, with sports sedan body in each case. On the British market, purchase tax has to be added to these prices.

D. S. Harder Supervises All Ford Buying

Following the death of Albert J. Browning, vice-president and director of purchasing at Ford, and George Walker, purchasing agent at Lincoln-Mercury, the purchasing operations of the Ford Motor Co. are now under the supervision of D. S. Harder, vice-president and director of manufacturing. Carl F. Unruh has been appointed general purchasing agent of Ford operations, and Herbert H. Foster has been named general purchasing agent of Lincoln-Mercury operations.

Bolens Huski Ridemaster, New 5-Hp Tractor

Powered by an air-cooled gasoline engine developing five hp, the new Bolens Huski Ridemaster tractor, featuring front wheel drive, was recently introduced by the Bolens Products Div., Food Machinery Corp., Port Washington, Wisc.

Chrysler Institute Awards Masters Degrees to 32

The graduate school of the Chrysler Institute of Engineering has awarded master degrees in automotive engineering to 21 students. In addition, 33 students of the undergraduate school were awarded certificates in body drafting and design, mechanical drafting, science, and chemical technology at exercises held in Detroit. Two students were awarded diplomas for completion of high school work. Currently, 520 students are enrolled in the undergraduate sections of the Institute. Principal courses offered are body design, chemistry, English, mathematics, mechanical drawing, and physics.

JEEP SOPHISTICATION

Built on the same frame as the Jeep station wagon, with the addition of a stiffening X member, this new Willys-Overland sports phaeton, the Jeepster—equipped with overdrive as standard equipment—is powered by the 63-hp Jeep engine. Its wheelbase is 104 in.; overall length, 178½ in.; and height with top up, 63 7/16 in. The Jeepster was described in the November 1, 1947 issue of AUTOMOTIVE INDUSTRIES.

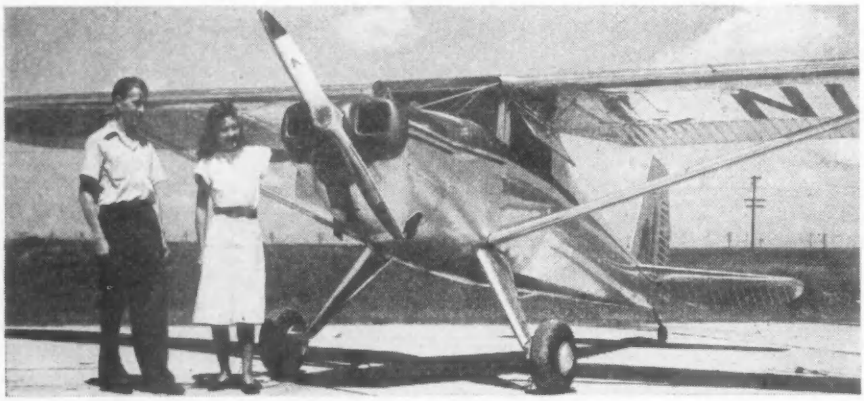
GE Completes Silicone Plant in Waterford, N. Y.

The General Eelectric Co. has completed a new multimillion dollar chemical plant for the manufacture of silicone materials in Waterford, N. Y. Including six buildings located on a 15-acre plot, the Waterford plant, in partial operation for about a year, is now ready to produce the war-developed materials at full capacity.

British Pioneer Aircraft to Make Marathon Plane

The Pioneer Aircraft Co., England, will produce the new Marathon airliner, 40 of which are on order for the British Ministry of Supply and British European Airways. A subsidiary company, which is to be set up for this purpose, will, also be responsible for the repair and servicing of Miles aircraft.

NEWS *of the* AUTOMOTIVE INDUSTRIES



A NEW LUSCOMBE

The latest addition to the Luscombe Airplane Corp.'s line of personal planes is this all-metal, two place 1949 Silvaire Sky Pal. Powered by a 65-hp Continental engine, the Sky Pal has a reported cruising speed of 105 mph and a top speed of 120 mph. Luscombe has also added the 1949 Silvaire Special, the 1949 Observer Special, and 1949 Observer Deluxe, the latter two replacing the original Observer-90.

Sun Oil to Build New Texas Plant

Beginning about August 1, the Sun Oil Co. plans to construct a plant near Jameson Field in Coke County, Tex. While it will primarily be a pressure maintenance plant, it will also have hydrocarbon recovery facilities; capacity will be 10 million cu ft a day, and production will be 30,000 gal a day of liquid hydrocarbons. Sun's Natural Gas and Natural Gasoline Div.'s $12 million program, started in 1946, calls for a total of nine plants in various oil producing areas throughout the country.

Lima-Hamilton Buys WAA Lima Tank Arsenal

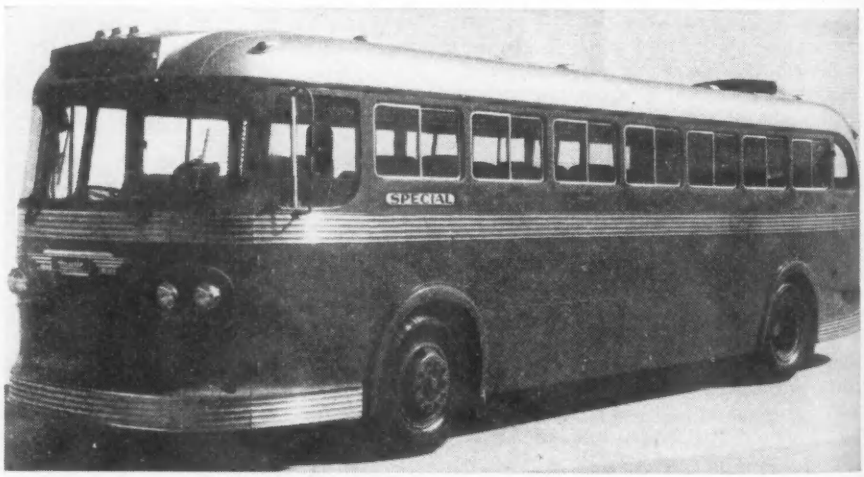
Planning to make cranes, draglines and heavy shovels, the Lima-Hamilton Corp., Lima, O. has bought the government-owned portion of the Lima Tank Arsenal, Lima, O., for $303,372. Successor to the Lima Locomotive Works, Inc., the corporation has occupied the facility since January 7, 1947, and has agreed to pay $35,000 rent in addition to the purchase price. The property includes a main manufacturing building containing 80,000 sq ft of space.

Fruehauf Boosts Motor Transport on Radio

The Fruehauf Trailer Co. is actively promoting the interest of the motor transport industry through a 15-minute radio program over stations in 89 cities and 39 states. The program features Harrison Wood, world traveler and historian, in an interpretation of current news and comment on world affairs based on personal observation. The commercials are devoted to acquainting the public with the benefits of motor transport. Attention will be called to the confusing multiplicity of conflicting state regulations on size and weight of commercial vehicles and other problems the industry faces.

Ford Installs "Roadability" Gage in all Plants

A "roadability" gage, designed by Ford Motor Co. engineers and produced by the Standard Tool Co., Detroit, has been installed in all Ford plants including the recently completed units at Atlanta, St. Louis, Los Angeles and Metuchen, N. J. The gage, which checks the alignment of front wheels of new 1949 Ford, Mercury and Lincoln cars under simulated road conditions, rotates the front wheels at 30 mph on spinning drums that are nearly frictionless and free to rotate about a central axis. The drums are mounted in a dynamically balanced assembly and bear the full weight of the front of the car in a straight ahead position. Perfect aligning is possibile only when the wheels are in this position and moving. Aligning is done by an operator stationed in a pit under the gage. The driver of the car holds the steering wheel in a straight ahead position while the operator checks alignment on an instrument panel. Misalignment of the front wheels moves the drums inward or outward as they rotate. Green lights flash on the instrument panel if wheels are toed-out. Yellow lights flash when wheels are toed-in. When either condition exists, the operator makes corrections. When all lights are out the front wheels are perfectly aligned.



AUSTRALIAN STREAMLINER

Designed and produced by Ansair Pty. Ltd., a subsidiary of Ansett Transport Industries, Australia, this streamlined, 28-passenger, rear-engined super coach is built on a Reo chassis, and is of composite wood and metal construction with aluminum panels.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Morris Building Secret British Jeep

A Jeep-type vehicle is being readied for production by the Morris Organization. By British Government order, it is classified as secret, but one of its known features is torsion bar suspension front and rear.

Cincinnati Parts Plant Added by Crosley

Over 40,000 sq ft has been added to Crosley Motors manufacturing facilities in Cincinanti, O. by the purchase of a five-story factory building. The new building will be used as a service parts and accessories center.

FWD Incorporates New Foundation

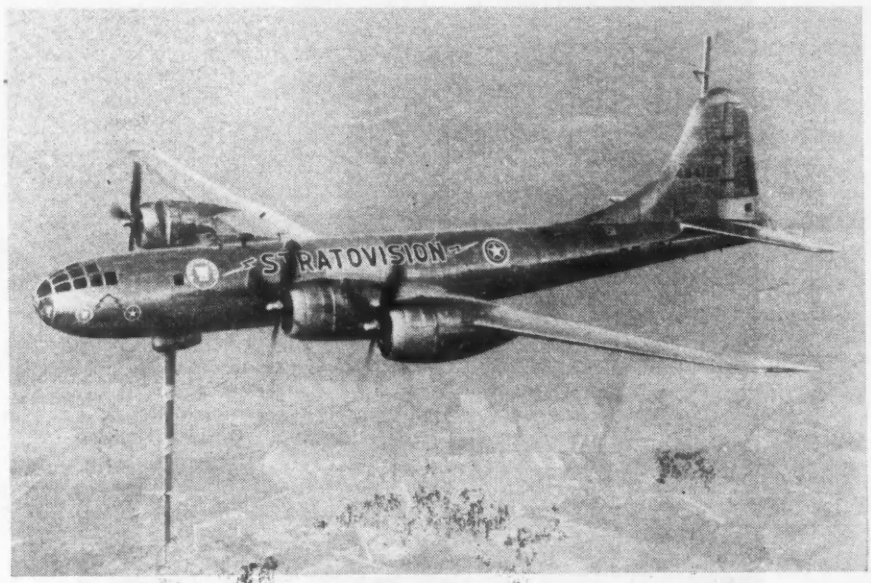
Exclusively for charitable, educational, scientific, and literary work, the Four Wheel Drive Foundation has been incorporated under Wisconsin law, according to Walter A. Olen, president, Four Wheel Drive Auto Co. Articles of incorporation of the new foundation permit gifts and grants to charitable, educational, scientific and literary associations, corporations, institutions and societies as well as to individuals. Educational aids by the foundation may include scholarships and fellowships to FWD employees.

Douglas & All American Join in Conversion of DC-3's

Marking the first time that a short-haul operator and the manufacturer have collaborated to develop a DC-3 especially for feeder type air service, a fleet of DC-3 type transports custom designed by All American Aviation, Inc., and the Douglas Aircraft Co. for efficient short-haul operations is under conversion at the Douglas Santa Monica, Calif. plant.

Sealed Power Buys WAA Piston Ring Plant

The Sealed Power Corp. has bought a surplus aircraft piston ring plant at Muskegon, Mich., for $350,000 according to the WAA. The property consists of a single building containing a machine shop section and an office on a 1.57-acre site.



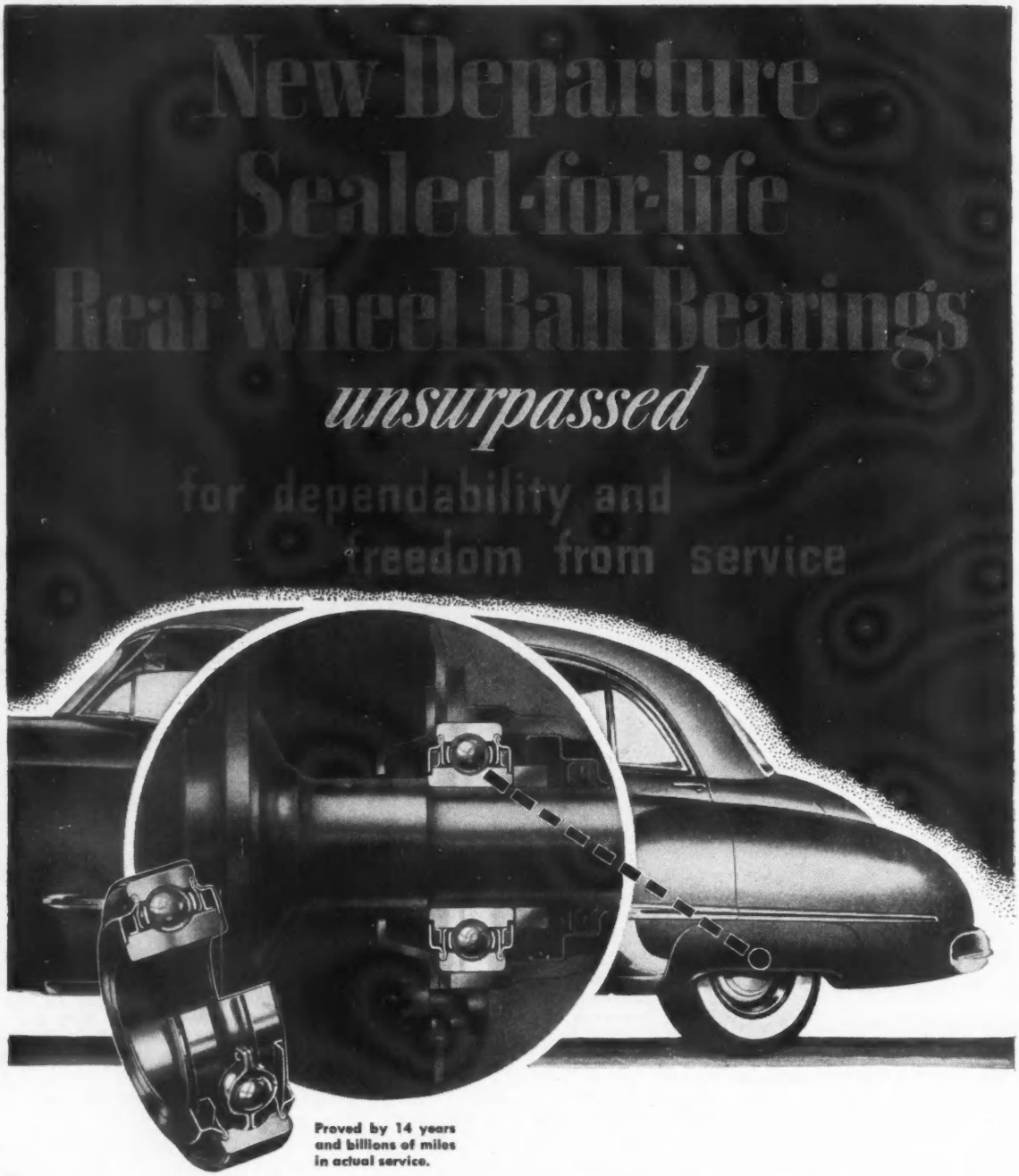
TELEVISION BY STRATOVISION

This experimental flying Stratovision station, a modified B-29, successfully rebroadcasted telecasts recently. Under joint development by the Westinghouse Electric Corp., and the Glenn L. Martin Co., the Stratovision system will use modified Martin 2-0-2's.

BRITISH POWER FOR ITALIAN TRANSPORT

Equipped with four Bristol Centaurus engines, the Breda Zappata 308, an Italian transport plane designed for transatlantic flight, was built by the Societa Italiana Ernesto Breda, Milan, Italy, with the cooperation of British aircraft engineers. Weighing about 105,000 lb, the new plane has a wing span of 138 ft, and length of 110 ft.

BUILT TO BE FORGOTTEN!



Proved by 14 years and billions of miles in actual service.

A New Departure creation—working unseen yet faithfully for driving pleasure.

Proof against neglect or wrong lubrication. No dirt can get in, no grease escape to cause slipping brakes. No bearing adjustment needed—*ever!*

New Departure has produced over 126 million self-sealed ball bearings of various types.

This year millions of cars will roll easier—smoother—on New Departure sealed-for-life rear wheel ball bearings.

Will yours?

•

A booklet of interest to automotive designers and owners alike will be sent on request.

nothing rolls like a ball

NEW DEPARTURE
BALL BEARINGS

17

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What the Industry Thinks about "F.O.B. Mill" Steel

Higher Car and Truck Prices Seen as Result of Adding Freight Charges and Higher Wages

By Leonard Westrate

THE first and immediate effect on the automobile industry of the switch by the steel industry to f.o.b. mill pricing is higher steel prices. That much is already certain, but it will still be several weeks before the automobile manufacturers will be able to determine just how much more steel cost is under the new pricing system. In addition, substantial increases in the base cost of steel already have started to appear because of wage increases to coal miners and steel workers and other mounting costs. These were slated to come regardless of what pricing system the steel industry put into effect at this time or later.

The basing point system was abandoned by the steel industry following the Supreme Court decision which ruled against the Cement Institute (see AI, June 15, page 24). The overwhelming opinion among industry leaders is that the decision will work great mischief to the entire economy.

What the new pricing system will mean to purchasing practices in the automobile industry in the future is not clear at this point. For the immediate future, however, the thinking now is that about the only effect will be the added cost of buying steel from distant areas. All companies intend to buy steel wherever they can obtain it and pay the increased cost of freight from the mill as long as the current steel shortage exists.

There also is more effort to get long-term contracts for steel on the part of all companies. General Motors and Ford with assembly and manufacturing branch plants scattered across the country, will reshuffle some of their buying to obtain steel as close as possible to their various plants. Others concentrated principally in one local area say they are still studying effects of the new system, and have arrived at no definite conclusions. However, not one of the automobile manufacturers questioned has any plans for moving operations closer to the source of supply. One parts supplier, Kelsey Hayes, is reported to be considering moving at least part of its operation to the Pittsburgh area, but will not officially confirm that fact.

Steel companies on the other hand apparently still are undecided about whether they will be forced to construct new facilities near areas of consumption in order to meet competition when the competitive market returns in steel. There have been various reports that some of the steel companies might pull out of the Detroit area in order to cultivate markets close to home now, rather than to wait until they are forced to do so. However, no large steel producer has given any indication that it intends to leave the Detroit market thus far. The general belief is that the market is too big to abandon now. Some of the smaller mills already in fact have left certain markets in order to avoid freight absorption, but total tonnage in the Detroit area has not been materially affected.

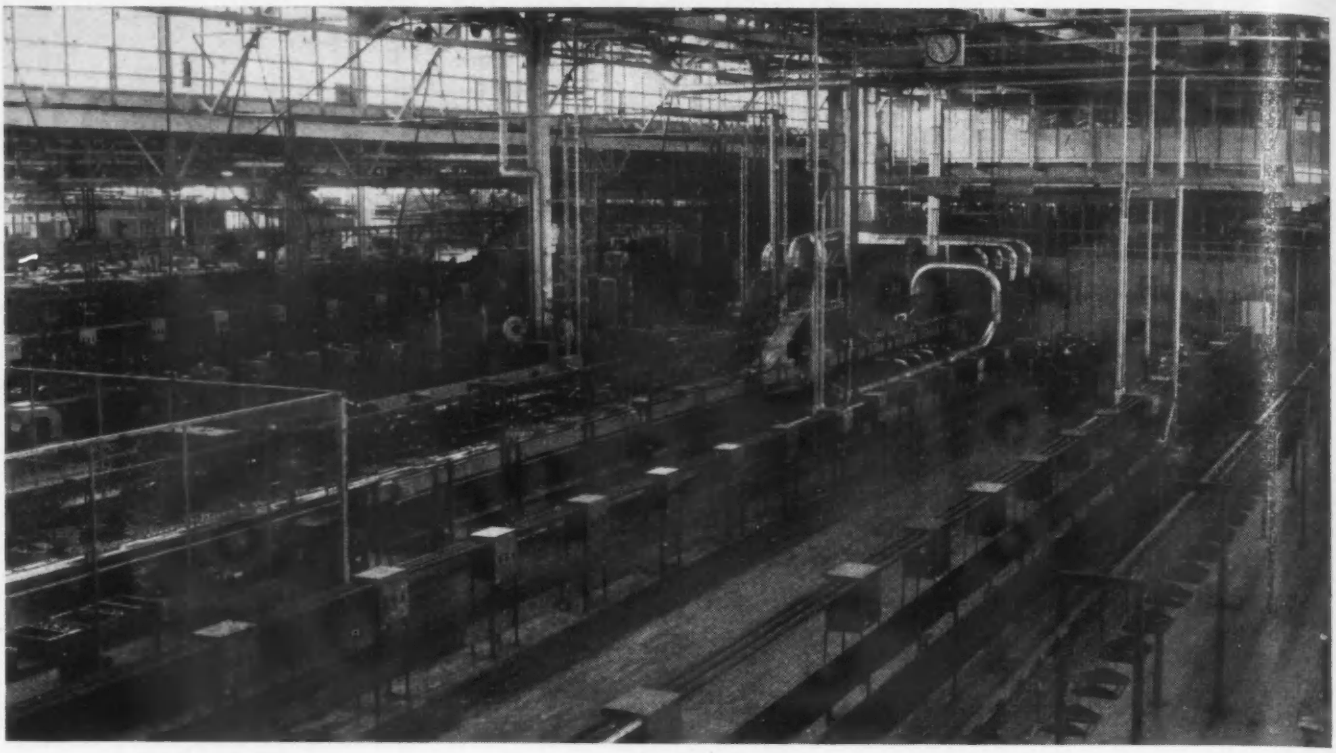
Theoretically with abandonment of the basing point system, companies close to source of supply should be able to buy steel for less under the new system than was possible when prices were on a uniform delivered basis throughout the country with nearby suppliers paying arbitrary or "phantom" freight (*Continued on Page* 60)

How Washington Views F. O. B. Mill Selling

By Eugene J. Hardy, Washington Bureau, Automotive Industries

Washington reaction to the steel industry's switch to f.o.b. mill selling has been varied. The Federal Trade Commission's attorneys in the current steel case were not satisfied, for they claim that exclusive f.o.b. mill selling is not the objective in their current case. Therefore, FTC intends to push this case to its ultimate conclusion—a cease and desist order requiring the steel industry to: (1) sell f.o.b. mill when requested; (2) establish a plant price at every mill; and (3) cease the compilation and dissemination of freight rate information.

On Capitol Hill, the return of Congress for the special session is expected to speed up the work of the Capehart subcommittee which is investigating the effects of the cement decision and its related aftermath. Senator Taft in recent weeks expressed the opinion that the problem "might have to be approached through amendment of the Robinson-Patman Act." This is considered a sound approach by many attorneys who feel that most of industry's troubles are the result of the Commission's nullification, over the years, of the proviso in the act which permits discrimination in good faith to meet competition.

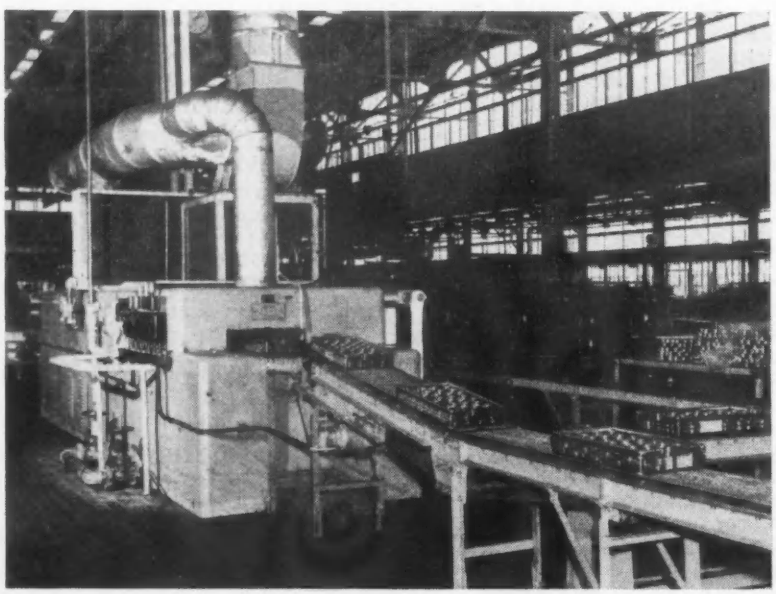


Million and a Half

"NOTHING rolls like a ball"—the slogan made famous by New Departure is subtly expressive of many hidden values in manufacturing philosophy. Since the making of anti-friction bearings is a unique specialty few people have an opportunity to see how a bearing is made and, consequently, only those concerned with the problem realize that it involves more meticulous attention to dimensional tolerances and quality control than anything else that goes into a motor vehicle.

In view of the human interest side of the story the writer was glad of the opportunity to view at first hand the new Sandusky plant of the New Departure Div., General Motors Corp. Designed to serve the bearing needs of passenger cars, trucks, and tractors, this plant is strictly a mass prouction operation, currently producing about 1½-million bearings a month. By concentrating on automotive bearings exclusively, N-D has been able to limit the number of types and sizes and thus has ideal conditions for a truly high production set-up.

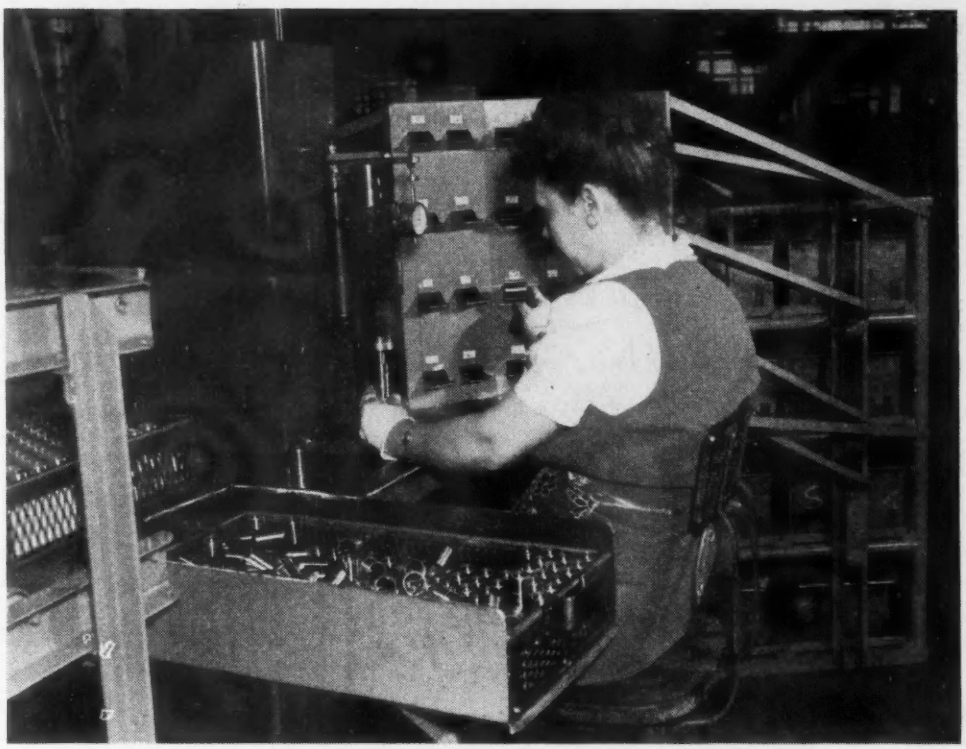
Significantly, materials handling and conveyorization are basic ingredients of the process, responsible for the smooth flow of materials and the organization of inspection and assembly lines. An extensive system of monorail conveyors



One of many automatic washing machines in the N-D plant, showing parts transported in baskets in and out of the washer, and moving on the belt conveyor to inspection and sorting benches.

(Left) Just to show a sample of the extensive facilities in individual departments, here is a balcony view of the bays in the grinding section. One of the many belt conveyors providing automatic movement of work may be seen in the foreground starting in the area where the system of piping is located.

(Right) Typical of the set-up for sorting parts in preparation for selective matching for assembly. Here we have the sorting of water pump shaft cups according to a dimensional code, parts being dropped into the proper slots —as shown—and rolled down chutes into bins.

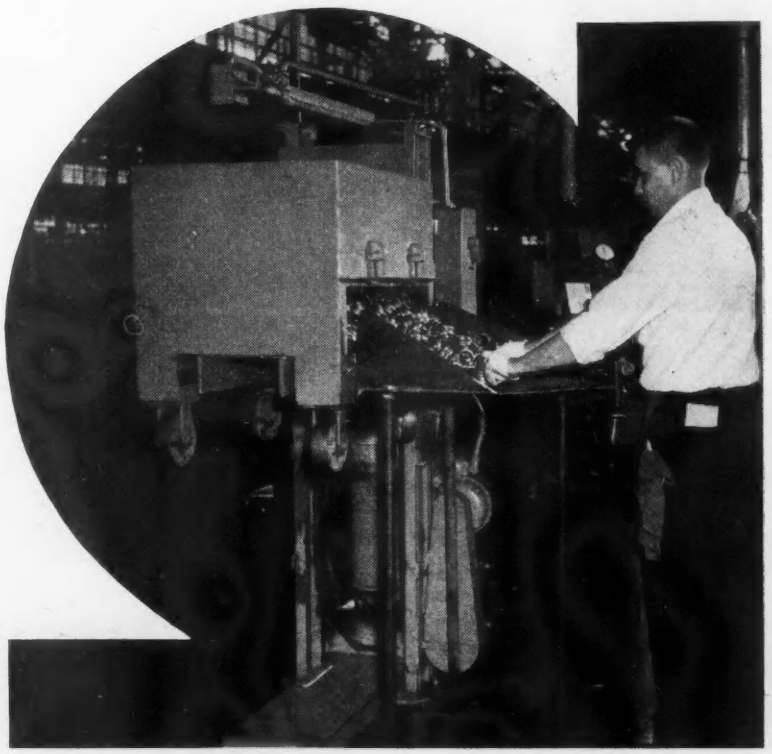


Automotive Bearings a Month

The High Production Setup in New Departure's Sandusky Ball Bearing Plant

By Joseph Geschelin

is employed to transport parts from the forging department to the automatics; while the machine lines are traversed by another conveyor system carrying parts to the second operation and finally to the grinders. An interesting system of steel mesh belt conveyors links the various finish-grinding lines, automatically transporting parts to individual machines and then carrying them from the machine to the inspection and sorting benches. Similarly the individual as-



Close-up of one of a large battery of centerless grinders in the grinding department emphasizes another form of materials handling—pneumatically operated hoists which lift bins of parts received from the machine shop to the proper working height for feeding the grinder magazine.

sembly lines are served by the same type of belt conveyor system.

Individual Centerless grinders and surface grinders in the grinding department are provided with magazine feed and automatic discharge chutes. Centerless grinders also are provided with portable power-driven flight conveyors to load finished work from the machine into an overhead bin.

Frequently the questoin arises, "How is a ball made?" The process is complex and subject to exacting control and constant vigilance. Briefly this is how N-D makes balls at Sandusky.

1—The process starts with the receipt of wire of ball bearing alloy, in coils.

2—The coils are annealed in batches in enormous vertical furnaces, fired with natural gas but having a stand-by storage of propane for emergency use.

3—After annealing, the coils are de-scaled and pickled, and wire-drawn to size.

4—The coils then go to the battery of heading machines which are similar in appearance to the four-slide headers used in the industry. The cycle of the header is so rapid as to make it difficult to see what happens. Actually it is arranged to cut the wire to length, then transfer the small bit of wire to the heading station where the metal is gathered into ball form by squeezing in a spherical die.

5—As the balls come out of the headers they are transported to another section of the department for normalizing in rotary gas-fired furnaces.

6—Now the balls are flash-ground in a battery of speical grinders—to remove header flash and rough-grind the contour.

7—Next they go to a battery of grinders for rough grinding to correct the contour.

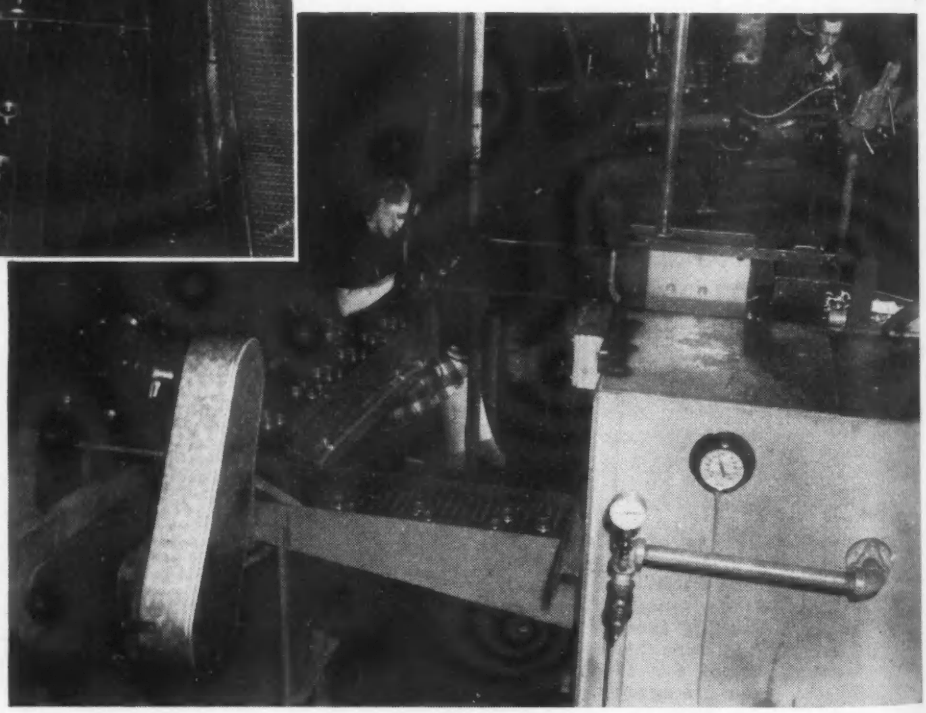
8—Now that the ball contour has been rectified in the soft state, the balls are heat treated to develop the proper physiscal properties.

9—In the hard, the balls receive two finish-grinding operations.

10—Before inspection and sorting the balls are given a double cleaning treatment.

Thoroughly cleaned, the gleaming balls enter the inspection room where they are given a 100 per cent visual inspection. This is an exacting operation requiring speical skill and a quick eye. Women inspectors will detect flaws so minute that the layman could hardly see them unless his attention is directed to a specific flaw. Nevertheless, even the work of these skilled people must be re-checked to eliminate human error. Each load of accepted balls is given a sampling check by another inspector. For this purpose the inspector selects a tray-full of balls

(Below) Another inspection operation—visual inspection of inner races as they come off the grinders at the right, rear. Parts reach the inspector directly from the last machine and as they are accepted the operator drops them onto the belt conveyor which transports them to the washer in the foreground.



(Above) Close-up of a portion of the belt conveyor line in one of the bays, linking finish-grinding with inspection and final assembly benches. This view shows inspection of front wheel cones as they come from finish grind. Note the system of guide rails and deflector at the operator's station. Cones are automatically deflected from the belt and dropped into the hopper in the foreground. Accepted parts are replaced on the belt for transport to the washer and assembly.

picked at random from a box and visually inspects the tray load. If three defects are found in any tray sample, the entire box is rejected and returned to the original inspector for complete rechecking.

Accepted balls then are gaged automatically by machine and sorted as to size. This is done by means of speically designed ball gaging machines in which the balls are rolled down an inclined track between two edges. The track is wider at the bottom by a measured amount, making it possible to select ball size automatically in gradations of 0.0001 in. A number of tubes or chutes are installed at the proper locations along the track so as to lead the balls into sorting trays.

It is astonishing to learn that ball grinding machines can be adjusted to produce balls of an absolute diameter almost without sensible variation. This is verified by watching the operation of the gaging machines and noting that almost every ball drops into just one chute, although there are occasional variations in the course of a day's run.

Ball making probably requires more quality control, more individual inspection, and more 100 per cent inspections in process and at assembly than any other precision part used in an automotive vehicle. Generally speaking, the machine operator is provided with a set of gages for checking his work. As further protection floor inspectors constantly make sampling checks at all stations. This procedure is true of all metal cutting operations. Other stages of the process such as heat treatment, forging, washing, etc., also are subject to close control.

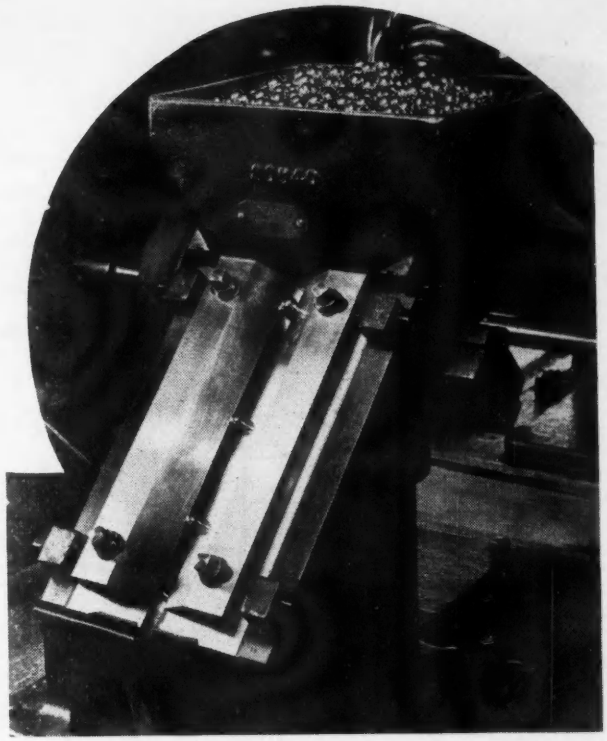
Despite that when the finished parts—inner races, outer races, etc.—are ready for assembly they are cleared through final inspection benches where they are gaged and sorted and matched for assembly with balls of suitable size. Even so the assembly as it progresses along the final line is gaged at every stage to assure conformity to specifications.

It is of interest to find that inner races or cones are made by at least two different methods, depending upon sizes. For the small cones they have developed a method of rolling grooved bar stock which is easier to handle in the automatics and at the same time offers superior physical properties in a piece of small diameter owing to the favorable grain structure. The larger cones are machined in chucking machines, using forging blanks. Similarly outer races are made by two methods—using tubing for small sizes, in bar automatics; and forging blanks for larger sizes, in chucking machines.

The technique of assembling a ball bearing may be just as obscure to many people as is the process of making the ball. To shed some light on this we have been given in detail the procedure for the assembly of a series of N-D bearings using eight or nine balls for the assembly, ball sizes ranging — 13/32, 3/8, 7/16, and 17/32-in. in diameter. Major steps of assembly are as follows:

1—Cups and cones received from the grinding department are first matched to determine the exact ball size for each assembly. Matching is done by checking for end play by hand loading with sample balls and gaging.

2—Matched pairs of cups and cones are washed in soluble oil, hot air dried and slushed in rust preventive spray and then placed on the belt conveyor for movement to the assembly stations.



Here is one of the automatic ball sizing machines. As described in the text, balls are given a 100 per cent visual inspection and screening by operators at the benches, then the balls are moved to the gaging machines and loaded into the magazine at the top for sorting for size. Balls roll down the inclined track one by one and drop into chutes at various points according to minute variations in diameter.

3—Cups, cones and balls are assembmled in a hydraulic press.

4—The sub-assembly moves to the next station where the balls are spaced properly by means of a finger die operated by the press ram, the operator then inserting the staked separator half in place.

5—The bench inspector at the adjacent station checks each unit 100 per cent for end-play.

6—The next operator places the bearing in the staking press die, fits the other separator half over the rivets of the first half, and trips the press to head the rivets.

7—Then follows two individual bench inspections.

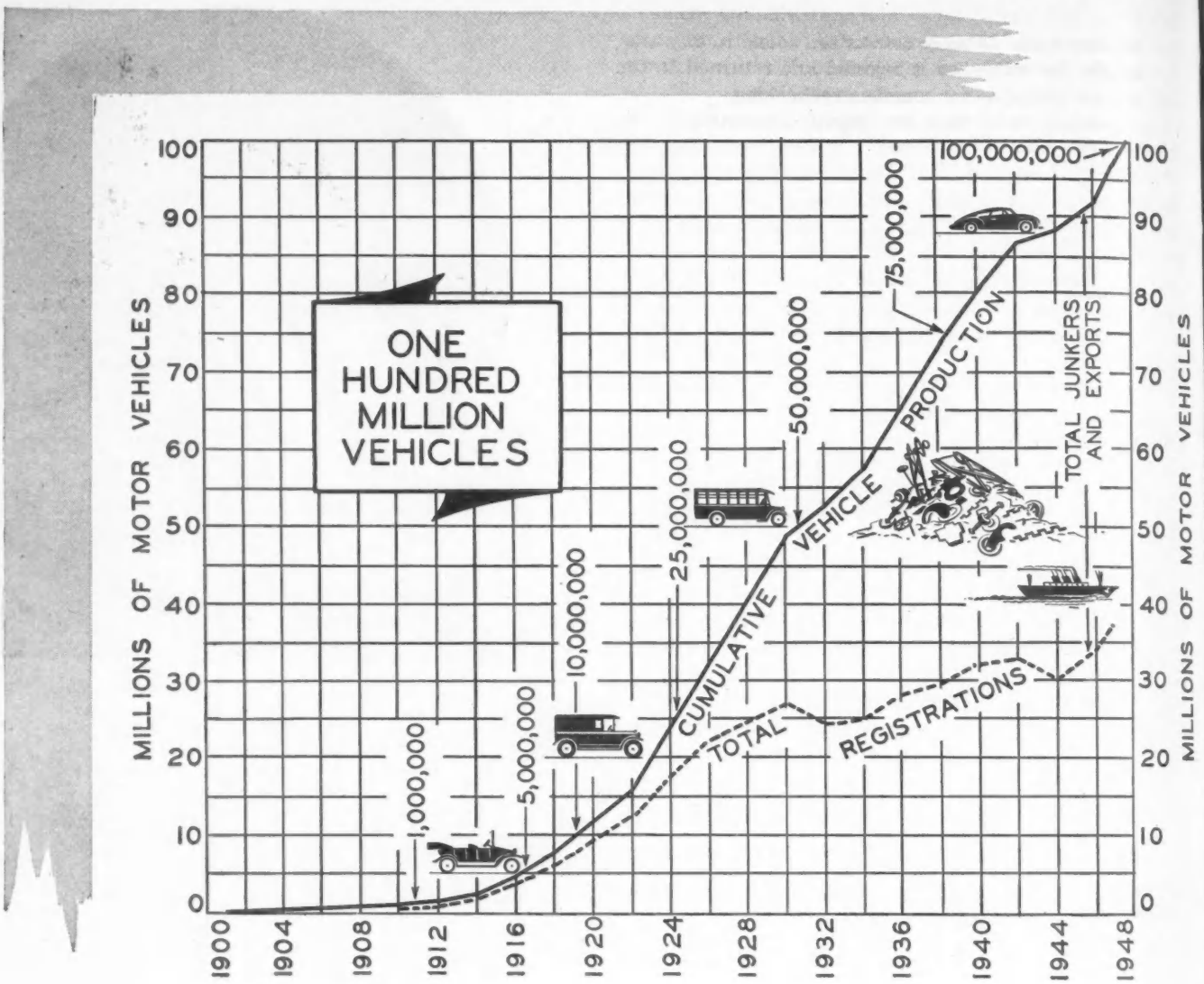
8—The bearing is carried on the belt to the washing station to be demagnetized and washed in preparation for the noise test.

9—Certain bearings, depending upon their end use, are checked 100 per cent for noise, roughness, tight or loose separator, dirt, etc.

It may be noted at this point that each of the bearing assembly lines is organized in a sequence of stations as described above, spaced along an assembly table served by an endless steel mesh belt conveyor. To simplify the task of the operators, each station has a deflector reaching over the belt to deflect bearings to the operator. Similarly, when the operator has completed her task the part is dropped onto the belt for movement to the next station.

The now well known N-D double-row pump shaft bearing assembly is processed in somewhat similar fashion on a separate assembly line.

Among the many innovations noted at every turn in the finish grinding department directly serving rangement for handling the soluble oil mixture used in the finish grinding departments directly serving the final bearing assembly (*Turn to page 92, please*)



Early this month from one of the 113 automobile assembly plants of 77 cities and towns will come the 100 millionth motor vehicle that has been built in this country since 1893. Due to the continuous flow from these assembly lines it would be impractical to determine from what plant this vehicle will come or whether it will be a passenger car, truck or bus, but a close watch on production figures will enable the industry to fix the time of its "arrival". Tentative plans were announced recently for celebrating the event, ending with an industry banquet, probably in November (see AI, July 15, page 19).

Of these 100 million vehicles, whose wholesale value amounted to over $75 billion, the United States still has some 39 million of them and another five million are in U. S. territories and foreign countries. The first 25 million vehicles were built in 32 years from 1893 to 1925, the second 25 million in six years by 1931, the third 25 million in eight years by 1939, and the fourth 25 million in nine years, which includes the years of World War II when production was limited to trucks and buses. The chart on this page shows the cumulative production of motor vehicles since the early years and the yearly registration of motor vehicles in the United States. On the next page will be found a chronological record of the significant design events in American passenger car history.

Design Progress in American Passenger Cars

1900—Automatic spark advance (Packard, Oldsmobile).
Speedometer (Jones).
Front mounted powerplant (Columbia).
Four-cylinder air-cooled engine (Franklin).
Wheel steering (superseding tiller steering).

1901—Shaft drive to rear axle.
Rear-entrance, tonneau-type body.

1902—Divided front seats for runabouts.
Four-cylinder, water-cooled, longitudinal front mounted engine (Locomobile).
Three-point support for power plant (Marmon).

1903—Radiators placed at front of engine space.
Canopy tops.
Anti-skid chains.

1904—Side entrance tonneau body.
Shock absorbers.
Pressure lubrication for engines (Pierce-Arrow).

1905—Magnetos (Remy Bros.).
Folding tops.
Annular ball bearings (Hess-Bright).
Universal rim for clincher or straight side tires (Goodyear).
Sleeve valve engine (Knight).
Six cylinder engine (National).
Ignition locks.

1906—Integral cylinder and crankcase construction (Northern).
Direct high-tension magnetos (Bosch).
Drop frame with single drop at rear (Peerless).
Spring bumper.
Vibrator-type horn.
Woven asbestos brake lining (Raybestos).

1907—Taxicabs.
Demountable rims (Firestone).
Magnetic type speedometer (Warner).

1908—Motor-driven horn (Klaxon).
Silent (toothed) chains for front drives (Knight).
Left-hand steering (Ford).

1910—Four-door bodies.

1911—Electric starter (Delco, on Cadillac).
Transversley split detachable rims.
Non-metallic gears for camshaft drives.

1912—Engine temperature indicator (Boyce Motometer).
Spiral bevel final drive (Packard).

1913—Wire wheels of triple-laced type.
Self-engaging starter drive (Bendix).

1914—Eight-cylinder, V-type engine (Cadillac).
Vacuum fuel feed (Stewart-Warner).
Thermostatic water circulation control (Cadillac).

1915—Aluminum alloy pistons.
Twelve-cylinder engine (Packard).
Lanchester torsional vibration damper.

1917—Wood wheels with steel felloes.
Steel disk wheels (Budd).

1921—Hydraulic brakes (Duesenberg).
Overhead camshaft engines (Wills-Ste. Claire and Duesenberg).

1923—Balloon tires.
High-pressure chassis lubrication (Alemite).
Lacquer finish for automobiles (Duco).
Ethyl fluid.
Air cleaners.

1924—Filter for crankcase oil (Purolator).
Vibration damper in clutch (Franklin).

1926—Hypoid gear drive (Packard).
Safety glass, wired type (Stutz).
Centralized chassis lubrication system (Bowen, on Chandler).

1927—Chromium plating.

1928—Mechanical fuel pump (AC).
Transmission gear synchronizing device (Cadillac).

1929—Laminated safety glass (Duplate, on Cadillac).
Front wheel drive (Cord, Ruxton).

1930—Sixteen-cylinder engine (Cadillac).
Oil cooler (Buick, Hupmobile).
Freewheeling device (Warner Gear, on Studebaker).
Dampers for valve springs (Studebaker).
Automatic hydraulic tappet clearance adjusters (Cadillac).

1931—Cast-iron brake drums (Chrysler).
Engine suspension on rubber in tension (Chrysler).
Automatic choke (Stromberg on Oldsmobile).
Automatic manifold heat control (Stromberg on Oldsmobile).
Floating inlet for engine oil pump (Willys).
Automatic spark timing by intake manifold vacuum (Delco-Remy on Plymouth).
Hard valve-seat inserts (Chrysler).
Steel-back precision bearings (Studebaker).
Aluminum cylinder heads (Graham).

1932—Shackle bolts with threaded bearing surface (Cadillac, Buick).
Cast-iron camshafts (Hudson).

1933—Ventilation by pivoted window sections (Fisher Body).
Anodized aluminum-alloy pistons (Lincoln).
Semi-automatic transmission (Reo).
All-helical-gear transmission (Chrysler).

1934—Independent front suspension (GM and Chrysler).
Automatic overdrive (Warner Gear, on Chrysler).
Engine mounted over front suspension (Chrysler).
Cast crankshaft (Ford).

1935—Steel roofs on automobile bodies (General Motors).
Unit construction of chassis and body (Lincoln-Zephyr).
Hydraulic hillholder (Studebaker).

1936—10-mm spark plugs (Packard).

1937—Transmission with automatic shift (Oldsmobile).

1938—Steering-column-mounted gearshift lever reintroduced (Pontiac).
Disk-type clutch spring with variable rate (General Motors).

1939—Fluid coupling (Chrysler).
Automatic transmission (Hydra-Matic, on Oldsmobile).

1940—Sealed Beam headlamps.

1941—Four-speed, semi-automatic transmission and hydraulic coupling (Chrysler).

1948—Hydraulic torque converter type transmission (Buick).
Automatic spark advance, 100 per cent vacuum controlled (Ford).

Twin-Engined Power Plant and R

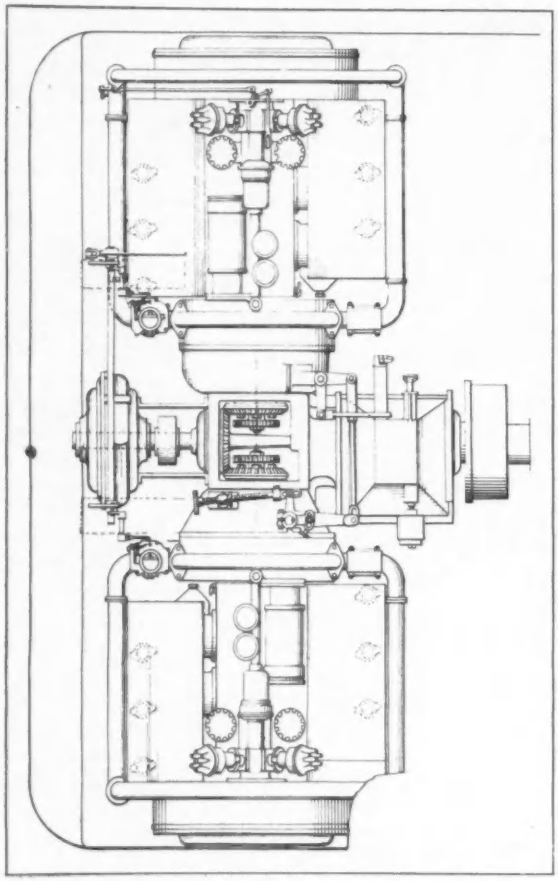


Fig. 1—Layout of engines, clutches, transfer case, and transmission at rear of Greyhound's experimental bus.

This Article Presents the Constructional Details of These Two Engineering Developments As Described at the SAE 1948 Summer Meeting by Milo M. Dean, Chief Engineer of The Greyhound Corp. A Technical Description of Greyhound's New Experimental Bus, in Which These Designs Are Incorporated, Was Published in the July 1 Issue of AUTOMOTIVE INDUSTRIES.

DESIGNED to improve operating efficiency and to eliminate road delays due to engine failure, the power plant of The Highway Traveler intercity bus combines two aircooled engines of the horizontally-opposed type with individual cooling fans. The two engines, each having a rated capacity of 154 hp at 2500 rpm, are arranged across the bus and are connected by means of a transfer case to form an integral power unit as shown in Fig. 1. The transfer case main shaft drives forward into a conventional four-speed transmission which is attached to the transfer case (see Fig. 2). A constant velocity universal shaft completes the drive to the rear axle. From the transfer case is also taken power to drive the accessories that are mounted on an accessory drive transmission, located above the power unit.

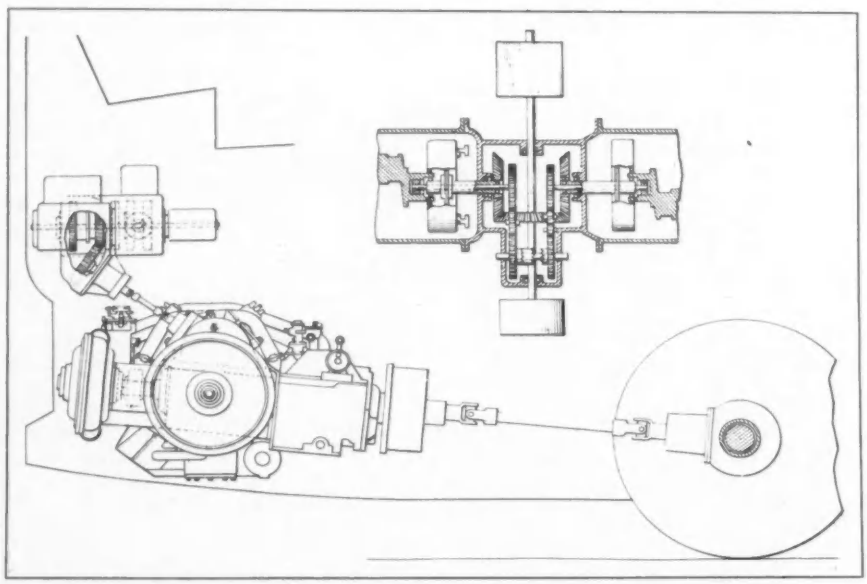


Fig. 2—Schematic drawings showing drive system and cutaway view of tranasfer case and transmission.

The power transfer case is in effect a gear box and two clutch housings connecting the two engines together at their fly wheel ends. This construction is illustrated in Fig. 3. It contains a main drive shaft, driven by spiral bevel gearing from the two engine clutch shafts. The

Rubber-Air Suspension System

Improve Inter-City Bus Operation

clutch shafts are hollow, permitting secondary shafts to extend through them to direct connection with respective engine crankshafts. The secondary shafts drive the accessory power take off gears in the transfer case. Selective gearing taking the power out of the transfer case (see Fig. 4) permits driving the accessories by either one of the two engines.

One engine, called the main engine, is fitted with a standard automotive manually operated clutch normally engaged and the other engine, called the accessory drive engine, is fitted with an automatic clutch normally re-

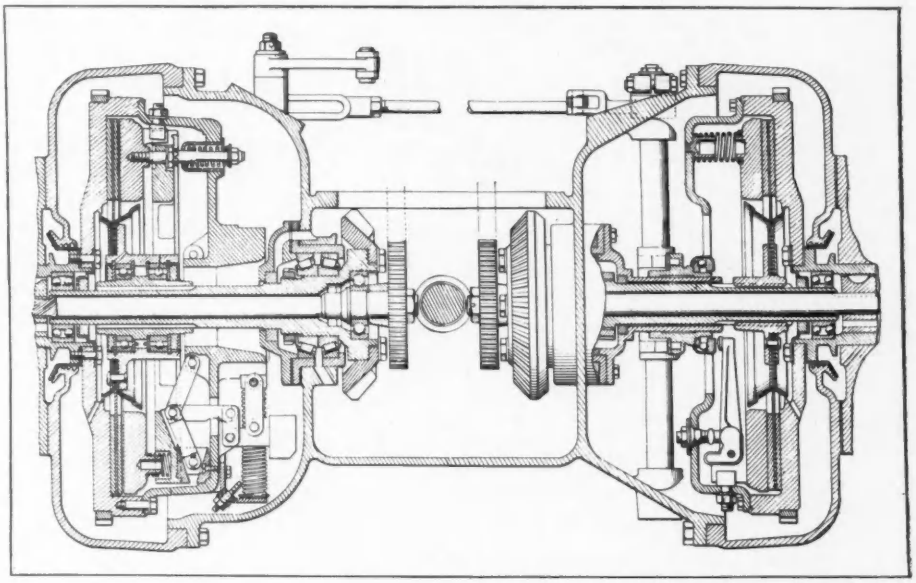


Fig. 3 (Left) Sectional view of the automatic and manually operated clutches.

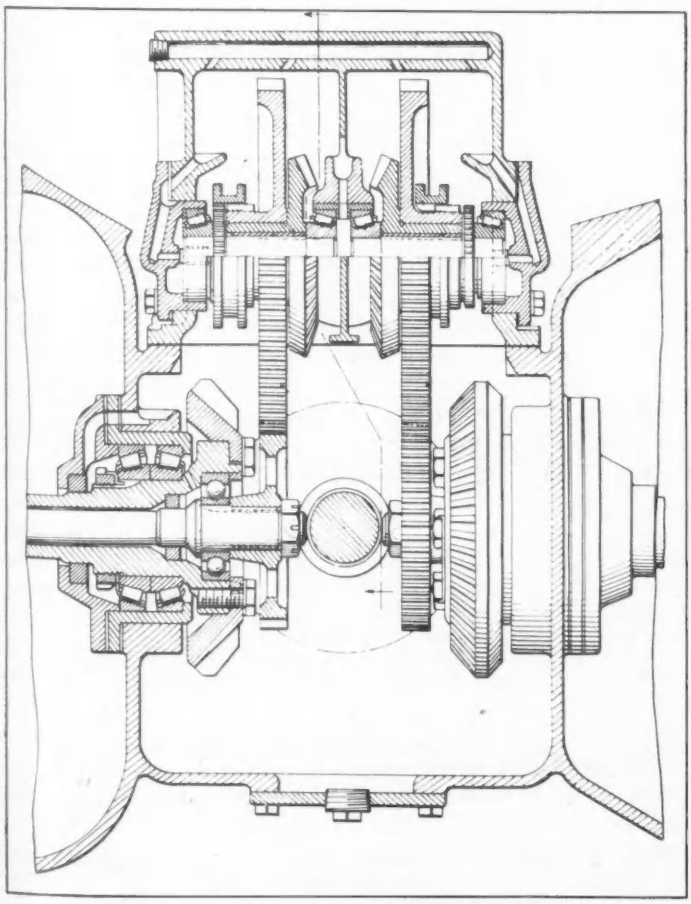


Fig. 4 (left) Details of accessory drive system.

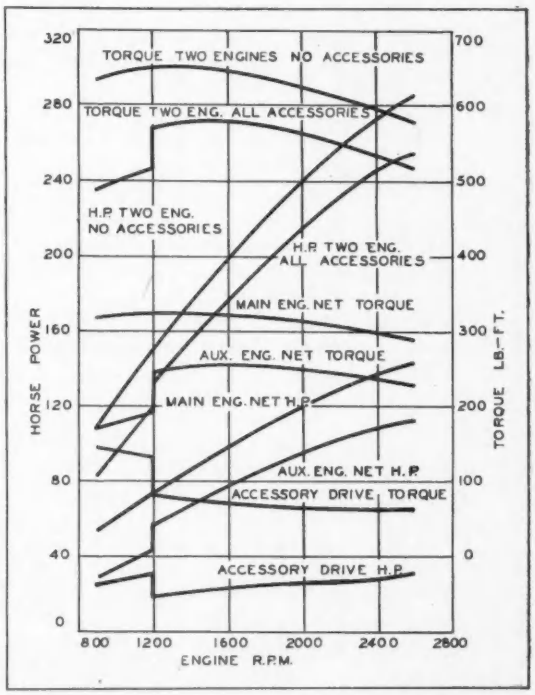
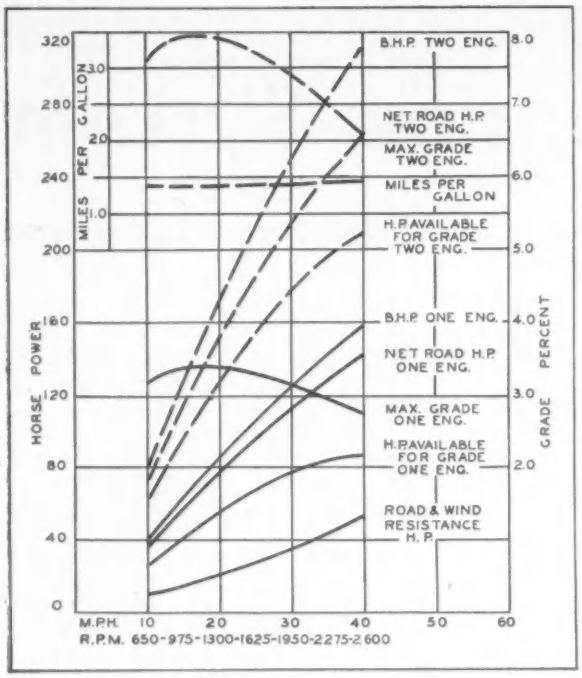
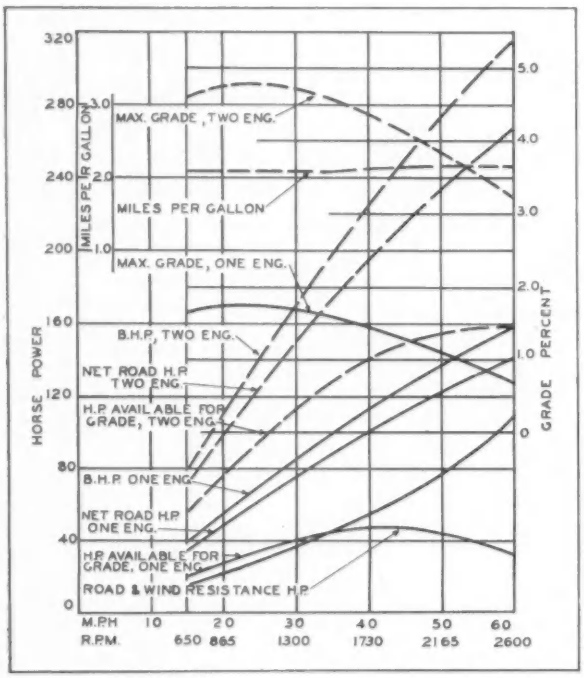


Fig. 5 (Above) Full throttle performance curves of twin-engined power plant in Greyhound bus.


B.H.P. TWO ENG.
NET ROAD H.P. TWO ENG.
MAX. GRADE TWO ENG.
MILES PER GALLON
H.P. AVAILABLE FOR GRADE TWO ENG.
B.H.P. ONE ENG.
NET ROAD H.P. ONE ENG.
MAX. GRADE ONE ENG.
H.P. AVAILABLE FOR GRADE ONE ENG.
ROAD & WIND RESISTANCE H.P.
HORSE POWER
MILES PER GALLON
GRADE PERCENT
M.P.H. 10 20 30 40 50 60
R.P.M. 650-975-1300-1625-1950-2275-2600


MAX. GRADE, TWO ENG.
MILES PER GALLON
MAX. GRADE, ONE ENG.
B.H.P. TWO ENG.
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H.P. AVAILABLE FOR GRADE, TWO ENG.
B.H.P. ONE ENG.
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H.P. AVAILABLE FOR GRADE, ONE ENG.
ROAD & WIND RESISTANCE H.P.
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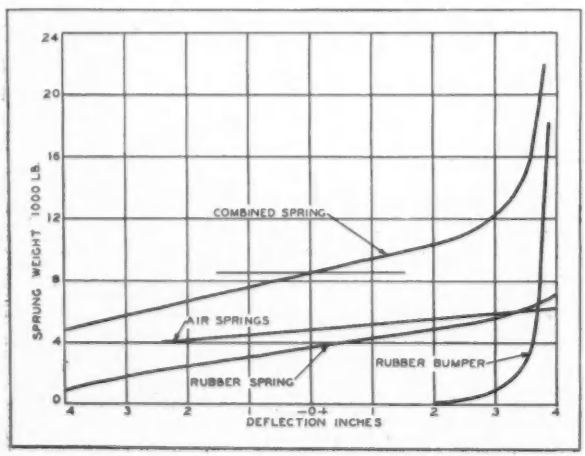


leased. This arrangement permits the bus to be handled on the main engine alone, using the other engine as standby power. This other engine under normal road conditions will furnish power for the accessories at a predetermined constant speed operation. At bus drive power demand, greater than available power of the main engine, the constant speed condition of the accessory drive engine is manually overridden by increased throttle pedal movement. The automatic clutch engages and as that engine reaches the speed of the main engine it will transmit power to the drive through an overrunning clutch, which is part of the automatic clutch, the power transmitted being part to full throttle beyond the momentary accessory drive power demand, depending on throttle pedal depression.

To reduce to a minimum the possibilities of complete road failure, the accessory drive power take off, as previously mentioned, is so arranged that the accessories may be driven from either one of the two engines and either one of the two engines may also handle the bus drive alone. The accessory drive can be transferred to the main engine by a shift lever on the transfer case. The bus drive can be transferred to the accessory drive engine alone by locking out the manual main engine clutch.

The accessories consisting of two generators, an air compressor, a brake and steering fluid pump, a freon compressor and a condenser fan drive are operated at their rated output speed when the accessory drive engine is operated at its governed standby speed. As the engine is accelerated to engage the bus drive, the accessory drive transmission changes gear ratio so as to protect the accessories from over speeding, as the engine is accelerated up to its speed limit. This gear shift is automatically accomplished and the normal drive ratio is automatically restored as the engine again comes down to the governed accessory drive speed. Engine and bus performance curves are charted in Figs. 5, 6 and 7.

Spring Suspension

The spring suspension on The Highway Traveler is composed of a set of rubber torsion springs acting parallel with a set of air springs in such a manner that normally about three quarters of the light weight of the bus is carried on the rubber springs and the remainder of the light weight and all passenger and baggage load is carried on the air springs. Characteristics of the rear suspension at one side are given in Fig. 8.

Fig. 6 (Top) Roadability curves of Greyhound bus at gross weight of 30,000 lb in third gear of 1.5 to 1 ratio. Rear axle ratio is 0.05 to 1 and tire rolling radius 19.6 in.

Fig. 7 (Center left) Roadability curves at gross weight of 30,000 lb in direct drive with rear axle ratio of 5.05 to 1 and tire rolling radius 19.6 in.

Fig. 8 (Lower left) Characteristics of rear suspension at one side.

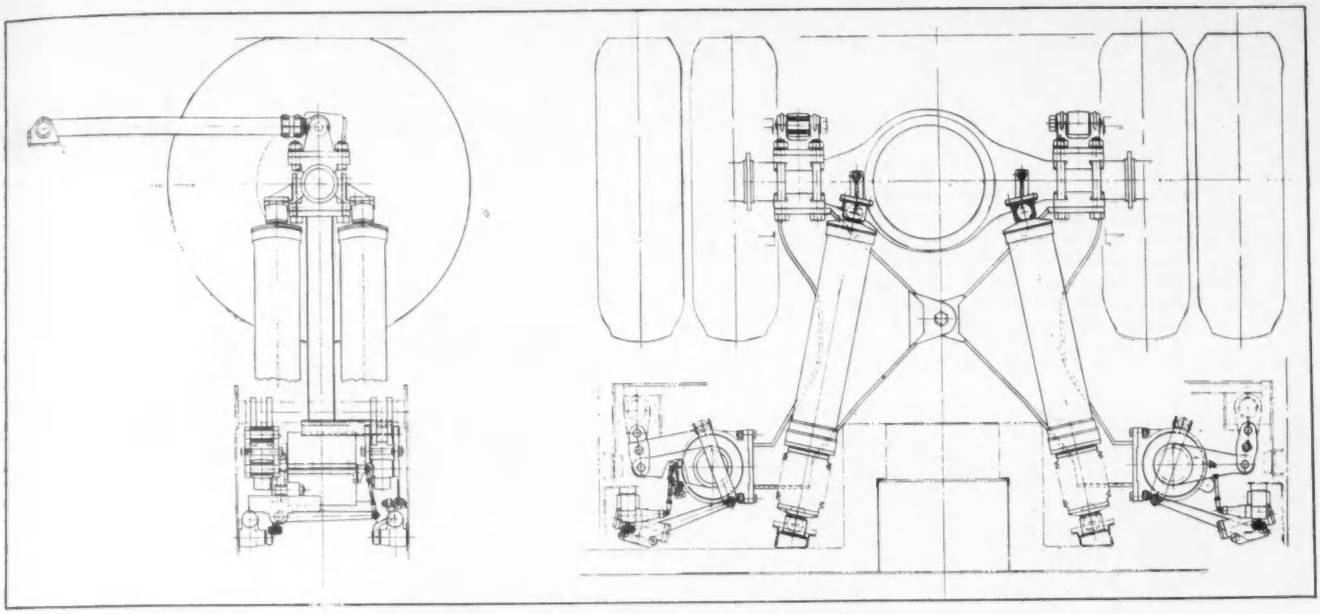


Fig. 9 (Above) The rear suspension system consists of four air springs and two rubber torsion springs. Their mounting is shown in this drawing.

The four cylindrical rubber torsion springs (see Fig. 9), which are relatively short and large in diameter to promote low spring rate, are mounted above the wheel wells on X-frame superstructures, extending up from respective axles. The axis of the spring is positioned longitudinally and the spring arms connect to transverse tension shackles mounted on structural members of the body near the side of the coach.

The air springs, which are of a cylinder and piston type, mounted at rear as shown in Fig. 9, are located behind the rubber springs in relation to the side of the coach and extend from the axle up to the body structure. Spherical rubber mounting top and bottom protects the cylinders from transverse loading. The compression ratio of the air spring is low for normal small axle movements to insure a comfortable spring rate with provisions for increased compression ratio resulting in higher spring rate towards the end of the spring travel. An inertia valve built into each air spring causes damping on rebound. Fig. 10 shows a sectional view of an air spring.

Four level control valves, located one above each wheel housing and attached to the body structure have their valve actuating arms connected to the respective axle superstructures with a linkage adjustable to the desired distance between axle and body. The valves control the air supply to, and exhaust from the air springs in such a manner as to maintain a predetermined road clearance within reasonably close limits regardless of bus loading conditions.

The body suspension points are located just below the center of gravity of the combined spring weights, thus reducing the possible roll moment to a minimum consistent with structural limitations and geometry of the spring suspension as a whole. Adequate resistance to transverse forces is attained without sacrificing freedom for individual vertical wheel movements. The axles are positioned by means of adjustable radius rods, two for each axle, extending forward from the axle to the body structure.

All movable pin connections have rubber torsion bushings resulting in elimination of the need for lubrication. The pistons of the air springs are lubricated from a pressure lubricator actuated by vertical axle movement. A set of small double acting shock absorbers are used to obtain desired damping on the spring system, these shock absorbers being mounted so as to be effective both vertically and to some extent laterally.

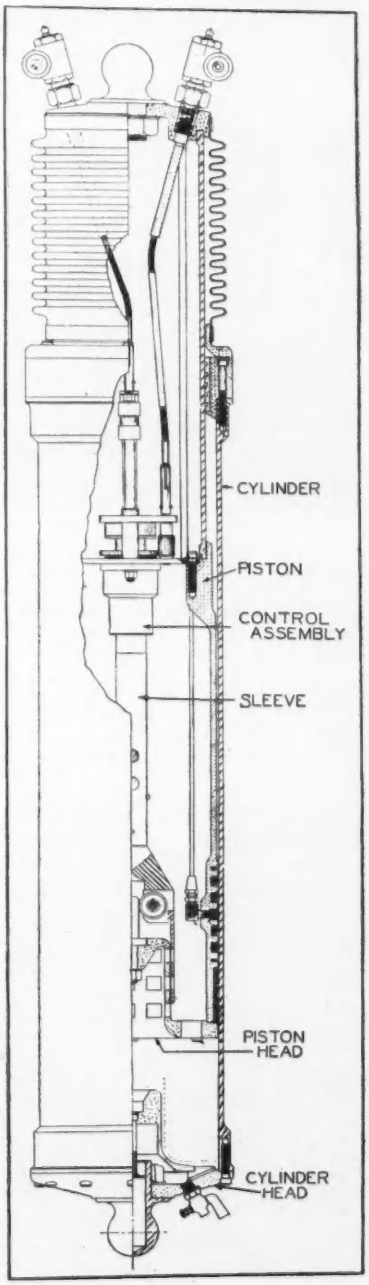
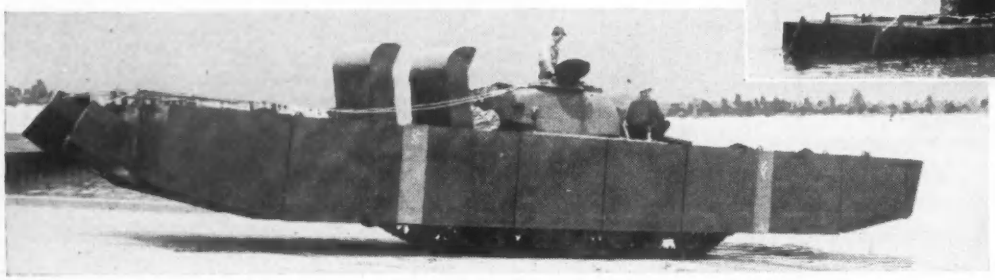
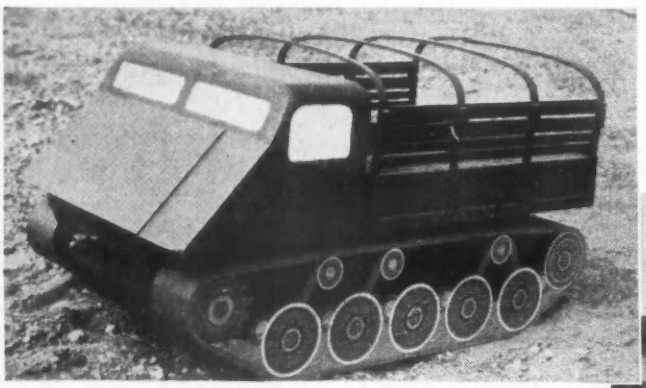


Fig. 10 (Right) Sectional view of air spring.

Uncle

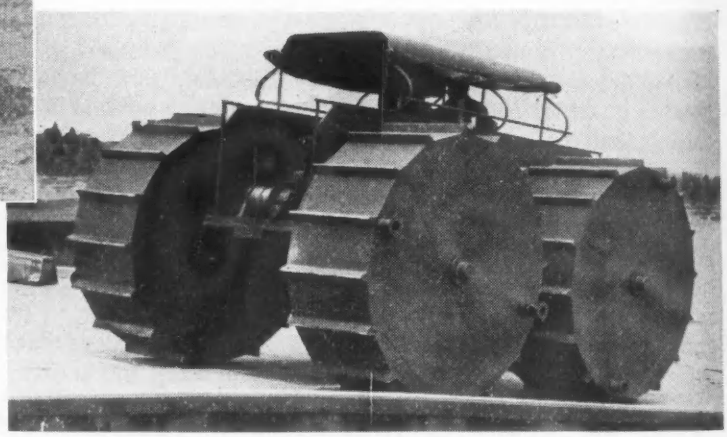
This M-4 medium tank (two views below) equipped with floats is capable of maneuvering in deep water at five mph. Its flotation gear consists of compartmented steel tanks, which can be jettisoned instantly, on landing, by electric firing of a charge.

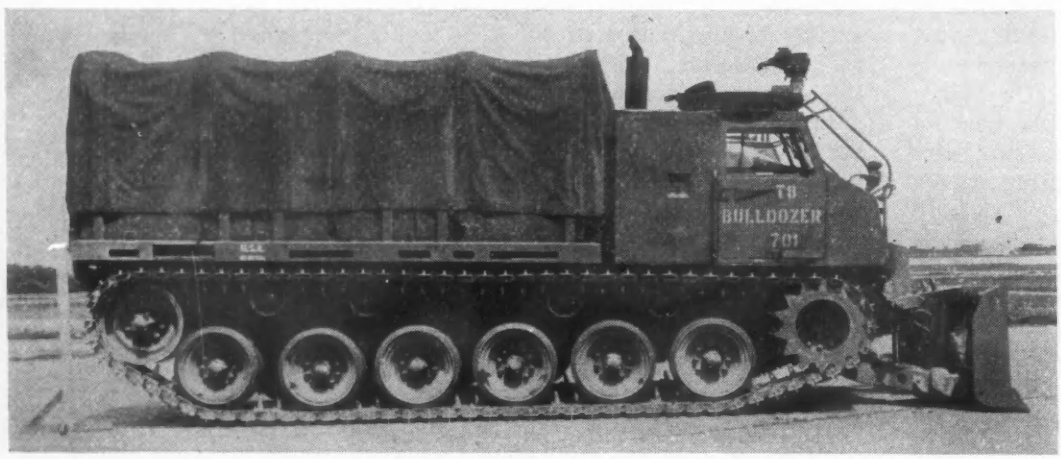




(Above) Mockup of light cargo tractor T43E1 now under development.

(Below) The swamp skipper, an amphibious vehicle that has possibilities for use as a light cargo carrier and tractor for snow and arctic areas. Its ground speed is over eight mph.





T8 bulldozer mounted on cargo tractor T-42

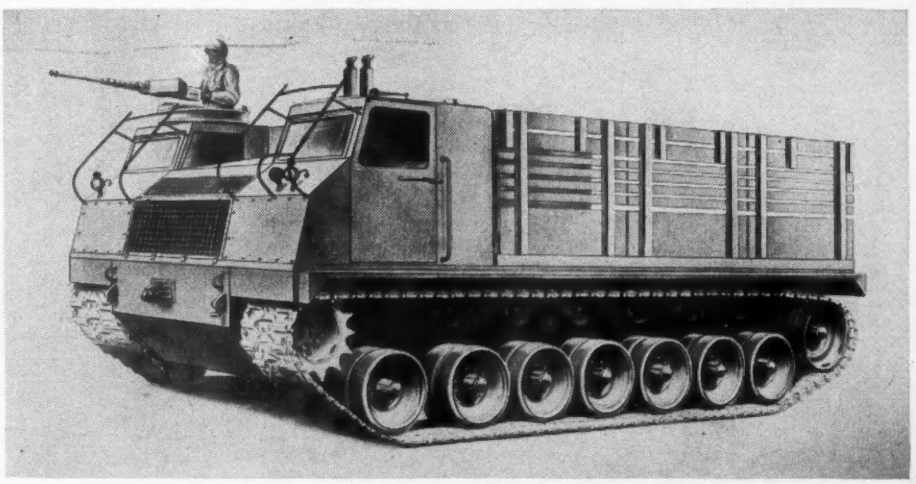
Sam's Newest

The Swimming Tank, Swamp Skipper and Other Modern Military Vehicles

WHAT has been accomplished the past three years in developing transport and tactical vehicles at the Detroit Arsenal, Army Ordnance tank-automotive center, is illustrated on this page and the following three pages. Many advanced engineering ideas, such as torsion bar springing, central tire inflation systems, sealed brakes, automatic locking differentials, hydraulic torque converters, aircooled engines, and others, have been incorporated in these military vehicles, most of which were exhibited at the recent Thirtieth National Meeting of the American Ordnance Association held at Detroit and Selfridge Field, Mich. Col. J. M. Colby, chief of the Development and Engineering Department at the Detroit Arsenal, explained the design of the wheeled tactical vehicles in June at the SAE French Lick summer meeting (see July 1 issue, page 32, AUTOMOTIVE INDUSTRIES).

More views on the following pages

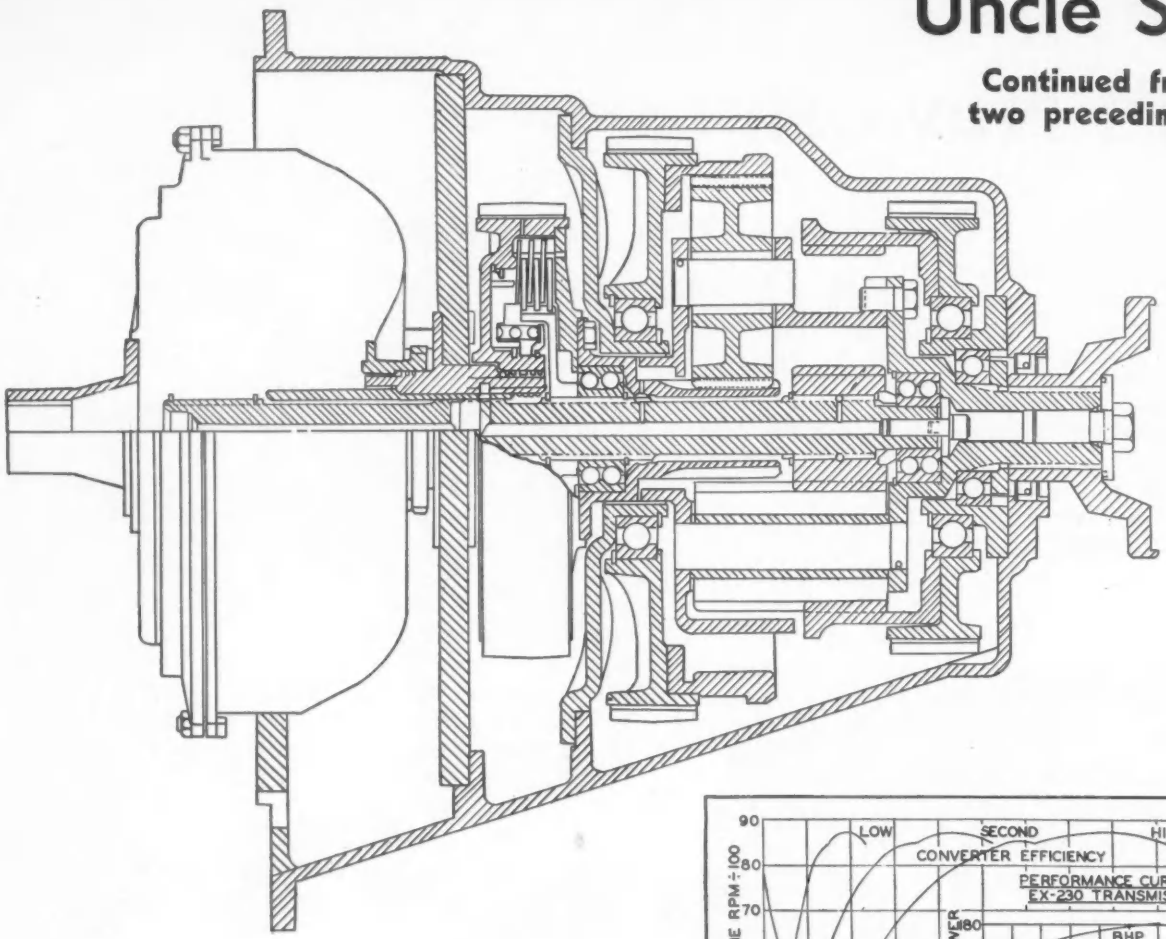
(Left) A 60-ton tank being loaded on a 100-ton 10-wheel cargo trailer coupled to a 20-ton 6 x 6 wheeled tractor.

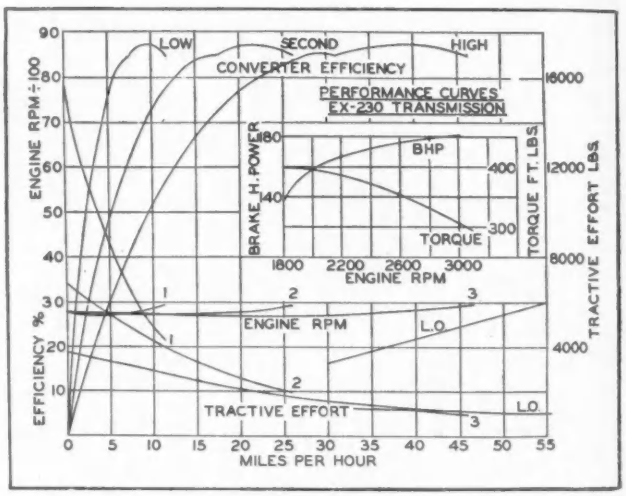


Drawing of the T-44 tractor being built at Detroit Arsenal for Army Ordnance.

Uncle Sam's

Continued from the two preceding pages





Sectional view and performance curves of hydraulic torque converter-planetary transmission used to power the T-51 five ton cargo carrier.

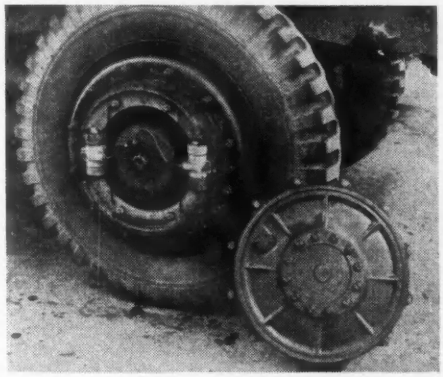
T-46, a 25-ton 6 x 6 tractor.

Newest

In addition to the T-51 and T-53 cargo carriers, which were described in the July 1 issue of Automotive Industries, page 32, Army Ordnance has this 12-ton unit.

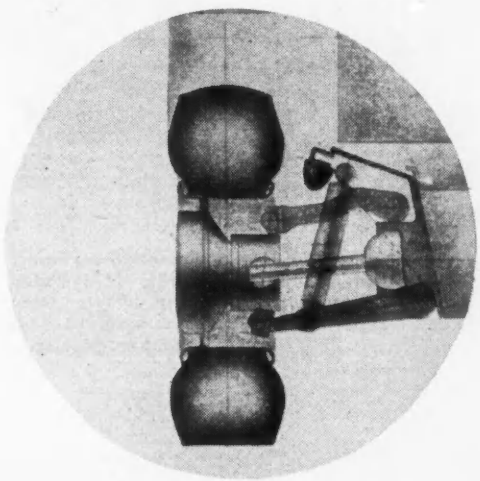
Comparison of latest Wheeled Cargo Carrier T-51 and World War I Track-Laying Cargo Tractor M-8.

Characteristics	Carrier, Cross Country T-51	Tractor, Cargo, M-8
Payload	5 Ton	5 ton..
Weight Empty; Fully Equipped Less Crew	15,850 lb	35,500 lb
Ratio: Cargo Weight to Vehicle Weight	63%	28%
Width, Overall	96 in.	117 in.
Length, Overall	254 in.	258½ in.
Height, Overall	103½ in.	114⅝ in.
Body Size	88 x 147 in.	110 x 145 in.
Ground Clearance, Axle	15½ in.	18¼ in.
Type Engine	7-Cyl. Opposed Air Cooled	9-Cyl. Radial Air Cooled
Brake Horsepower, Cross	250 @ 3000 RPM	475 @ 2400 RPM
Speed Maximum	55 MPH	35 MPH
Grade-Speed Ability	4.5% @ 25 MPH	3% @ 18 MPH
Fording Depth, Maximum	72 in.	40 in.
Cruising Range, (Approx.)	300 Mi.	200 Mi.
Torque Converter, Transmission	Yes, Automatic	Yes, Manual
Auto. Locking Differential	Yes	Controlled Steering Ratio 1.6 to 1.0
Type, Suspension	Independent Torsion Bar	Individual Torsion Bar
Service Brakes	Sealed Design	External Contracting
Tires	14.00-20, 10-Ply (Single) Tactical Service	Track, Steel Chevron 21 in. wide
Central Inflation System	Yes	(Not Applicable)
Generator	Ord. Hvy Duty 24 Volt	Ord. Hvy Duty 24 Volt
Cab	Open: Convertible to closed (Hard Top)	Closed

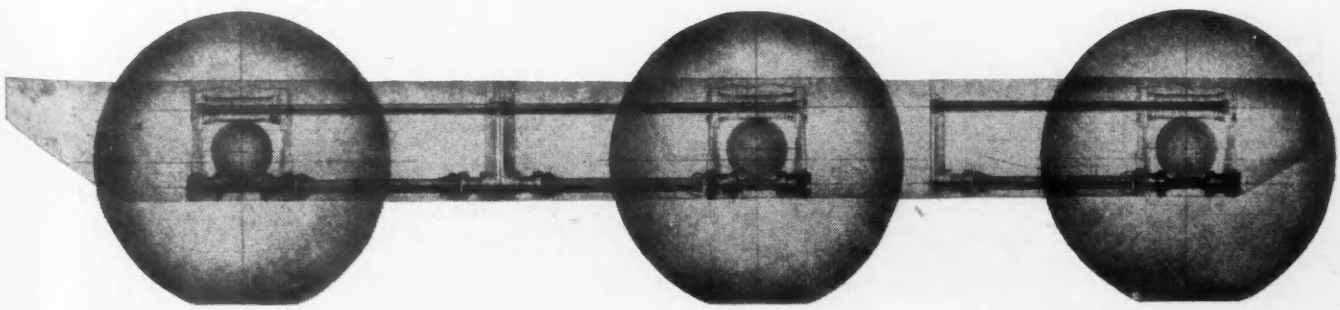


(Left) Sealed brake with drum removed. Not only does it exclude such destructive elements as water, mud and sand, but also permits inspection or maintenance without removal of the wheel.

More views on the next page

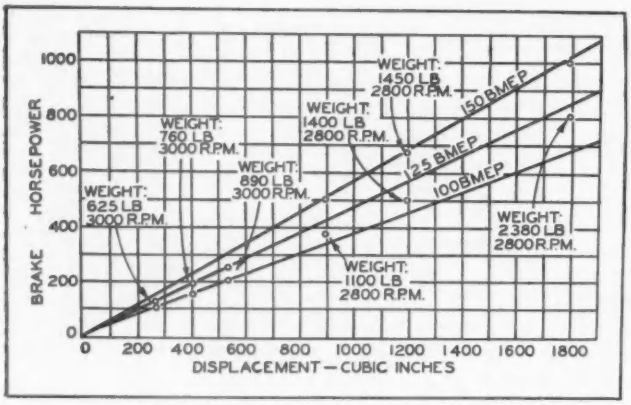


These two schematic drawings (below and circle) show the arrangement of the primary and secondary torsion bar suspension on the new Army cargo carriers.

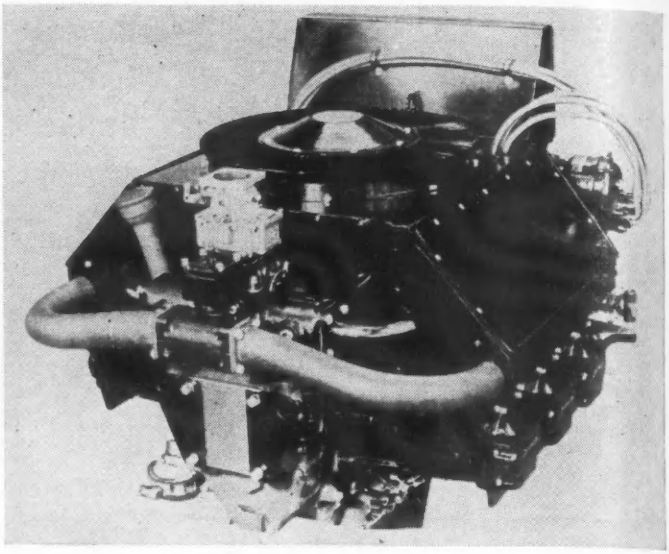


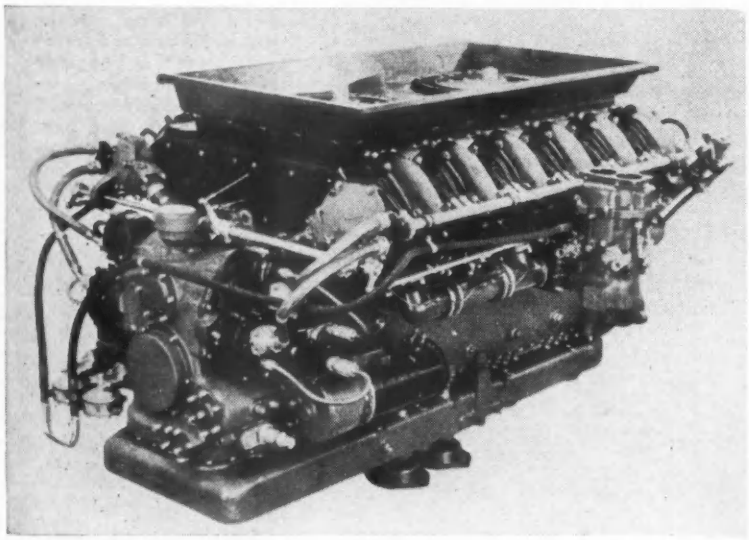
Uncle Sam's Newest

Continued from the preceding pages



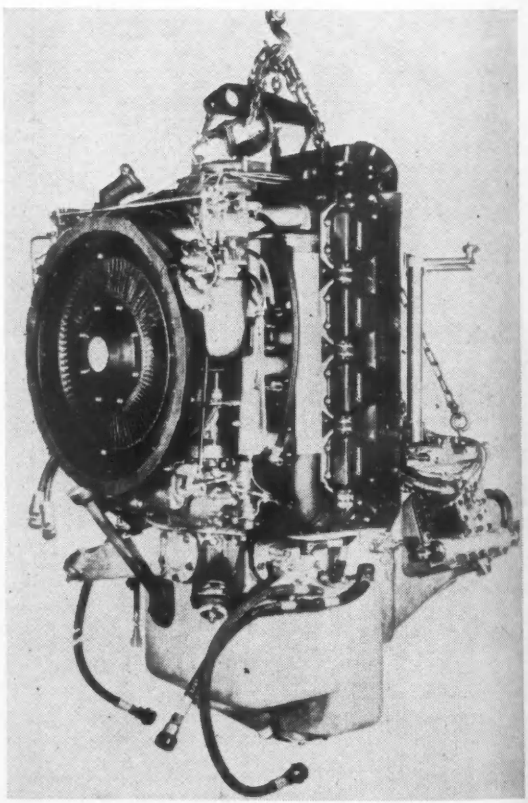
This chart shows the line of combat and transport vehicle engines being developed at the Detroit Arsenal for Army Ordnance. All are aircooled.





(Above) Model AO-402-2 six cylinder horizontally opposed engine of 402 cu in. displacement that powers the T-53 ¾-ton 4 x 4 cargo carrier. It develops 187 hp at 3000 rpm. Note the fan at the top. Air is pulled through openings in the sides of the hood.

(Above) Among the engines being developed at the Detroit Arsenal is this 12-cylinder V-type aircooled engine of 1790 cu in. displacement and 810 hp. A supercharged version develops 1040 hp on 80 octane number gasoline.



(Two illustrations at right) Mounted vertically at the extreme front of the T-51 five-ton 6 x 6 cargo carrier, this eight-cylinder engine of 536 cu in. piston displacement is rated at 250 hp.

Latest Transfer Machines at Ford Plant

Machining Operations on Transmission Cases and Covers Speeded by Improved Equipment

This is the unloading end of one of the two Cross Transfer-matics on the Ford transmission cover. As described in the text, it completes all of the operations on the cover in one pass through the machine

INSTALLATION of transfer type machinery continues at an accelerated pace in the plants of Ford Motor Co., the latest items of interest being found in the Foundry Machine Shop for machining transmission cases and covers. Apart from the inherent economy of these self-contained machines their most important advantage to the manufacturer is found in the great space economy offered by compact units which replace so effectively the usual line-up of many single-purpose machine tools.

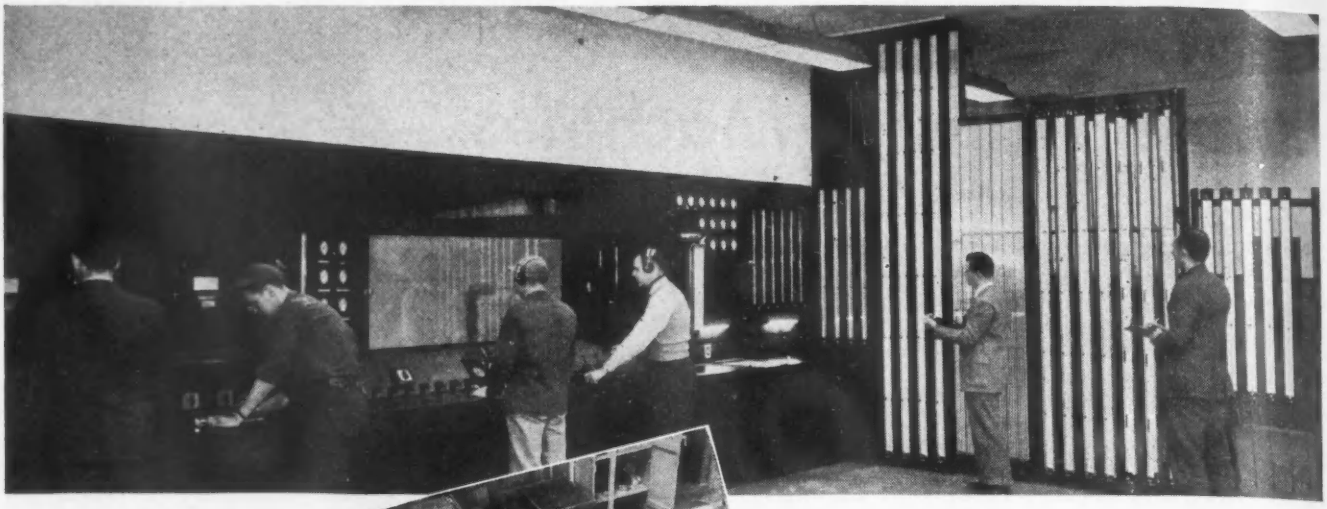
For machining the cover, Ford has adopted a new Transfer-matic machine recently developed by the Cross Co. of Detroit. For the transmission case, transfer units developed by W. F. & John Barnes are employed. In each instance the transfer machine handles the most operations, certain preparatory steps being tooled on other machines as will be noted below.

In preparation for the Cross Transfer-matic the bottom face of the casting which is to form the cover and gear shift housing, is rough- and finish-turned in a six-spindle Bullard Mult-Au-Matic tooled with double index. From this the parts go immediately into the Cross machine which is of 16-station type with 14 working stations, Station 1 being for loading while Station 16 is for unloading. Two pieces are loaded at Station 1 and are machined simultaneously at all stations. The sequence of operations is as follows:

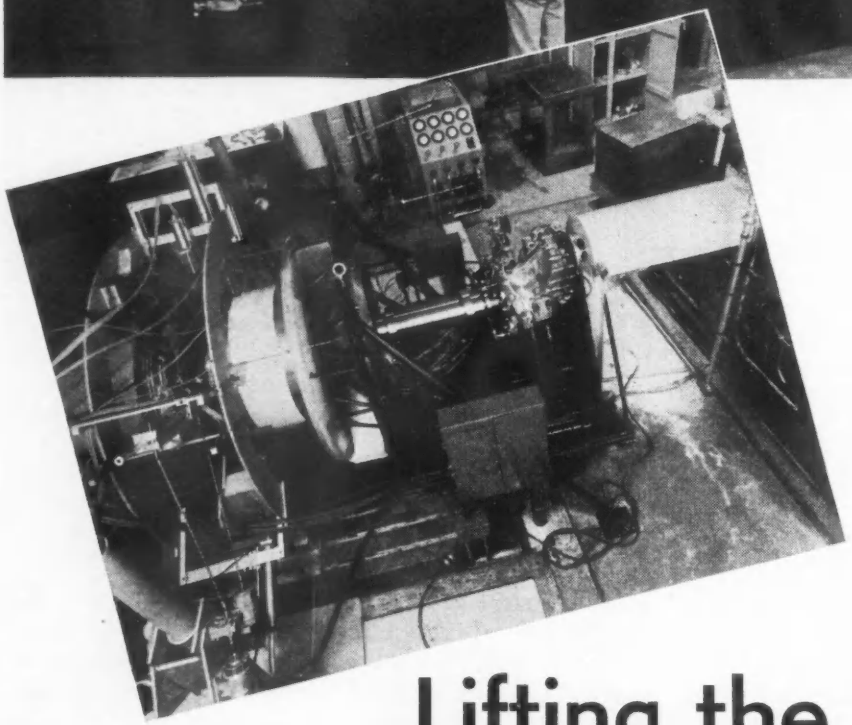
Station	Operation
1	Load.
2	Drill 9 holes in flange.
3	Ream 2 dowel holes in the flange.
4	Drill 2 holes for No. 0 taper pin—half-way.
5	Drill 2 holes for No. 0 taper pin, second half.
6	Ream 2 holes for No. 0 taper pin.
7	Drill one shifter rod hole 0.593 in. diam.
8	Ream one shifter rod hole 0.625 in. diam.

(*Turn to page* 90, *please*)

Each of the W. F. & John Barnes transfer machines on the Ford transmission case is built in two separate sections as described in the text. This shows the unloading station at the end of the first section

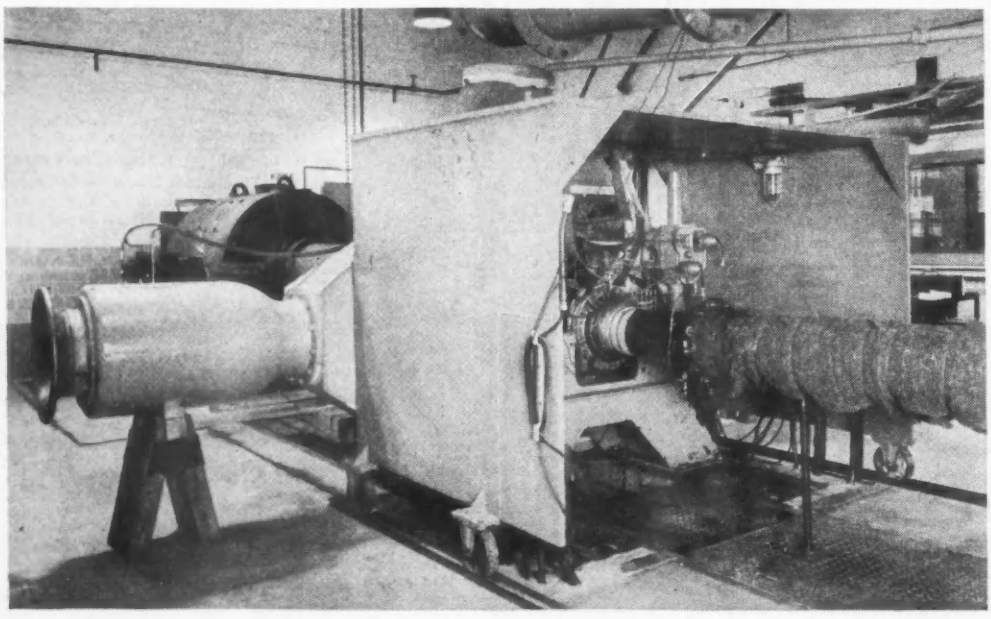


Control room of an engine test stand.



Aerodynamic performance of a gas turbine in actual operation can be predicted from results obtained in tests on this stand. The framework at the left carries remotely controlled motors which position the pressure and temperature instruments inside the turbine housing, while the shaft and gearset in the center transmit the turbine power to a dynamometer at the right.

Lifting the Secrecy Lid Packard Gas Turbine Research



Scale model compressors are tested here. The dynamometer in the background provides 800 hp for testing compressor wheels of 12 in. diam at 30,000 rpm.

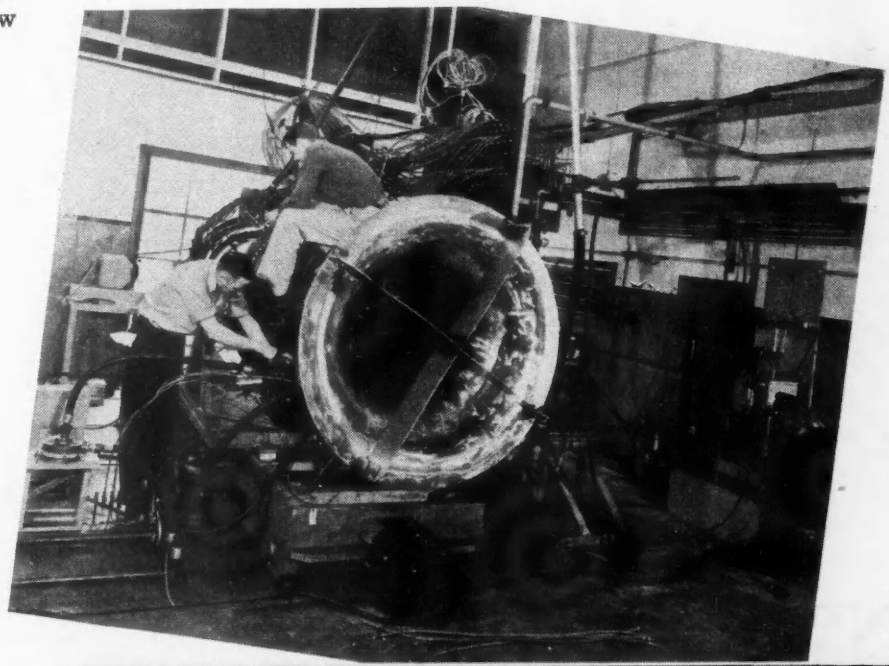
on the Plant

CLOAKED in secrecy since it was opened in May, 1945 by the Packard Motor Car Co. under an agreement with the Air Materiel Command, the gas turbine research plant at Toledo, Ohio, now is revealed as a $10,000,000 facility working on the exclusive development of gas turbines and related types of engines for aircraft and guided missiles. The research laboratories are housed in nine modern buildings containing 367,910 sq ft of floor space. The accompanying photographs show some of the special equipment installed there.

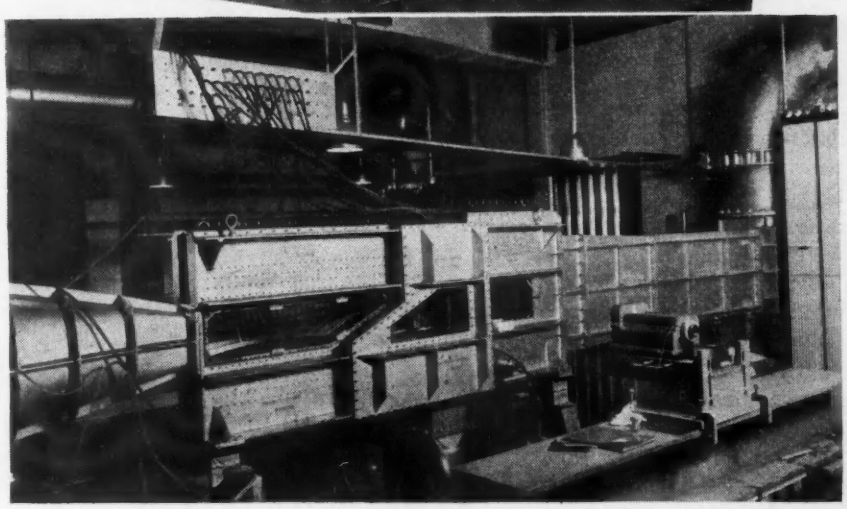
Among the various laboratories are those having to do with electronics, instrumentation, mechanical accessories, burner research, fuel flow, stress, turbine wheel and blade test, air flow, metallurgy, heat treat, combustion and many other fields. There are numerous test cells; several shops, such as those for sheet metal, machining, and tool and die work; and a large spin test pit with a drive turbine that will support assemblies weighing up to 1000 lb and driven at speeds up to 25,000 rpm.

Dynamometers in this plant can absorb up to 8000 hp. Air handling and refrigeration equipment can simulate altitudes up to 50,000 ft at temperatures down to 70 F below zero in tests on jet engines developing power required in modern fighter planes. As many as 270 separate test measurements can be made on an engine at the same time. There are three wind tunnels—two supersonic and a "vortex" tunnel. One use of the latter is for determining the best position of stator blades in directing the hot gas to the turbine wheel.

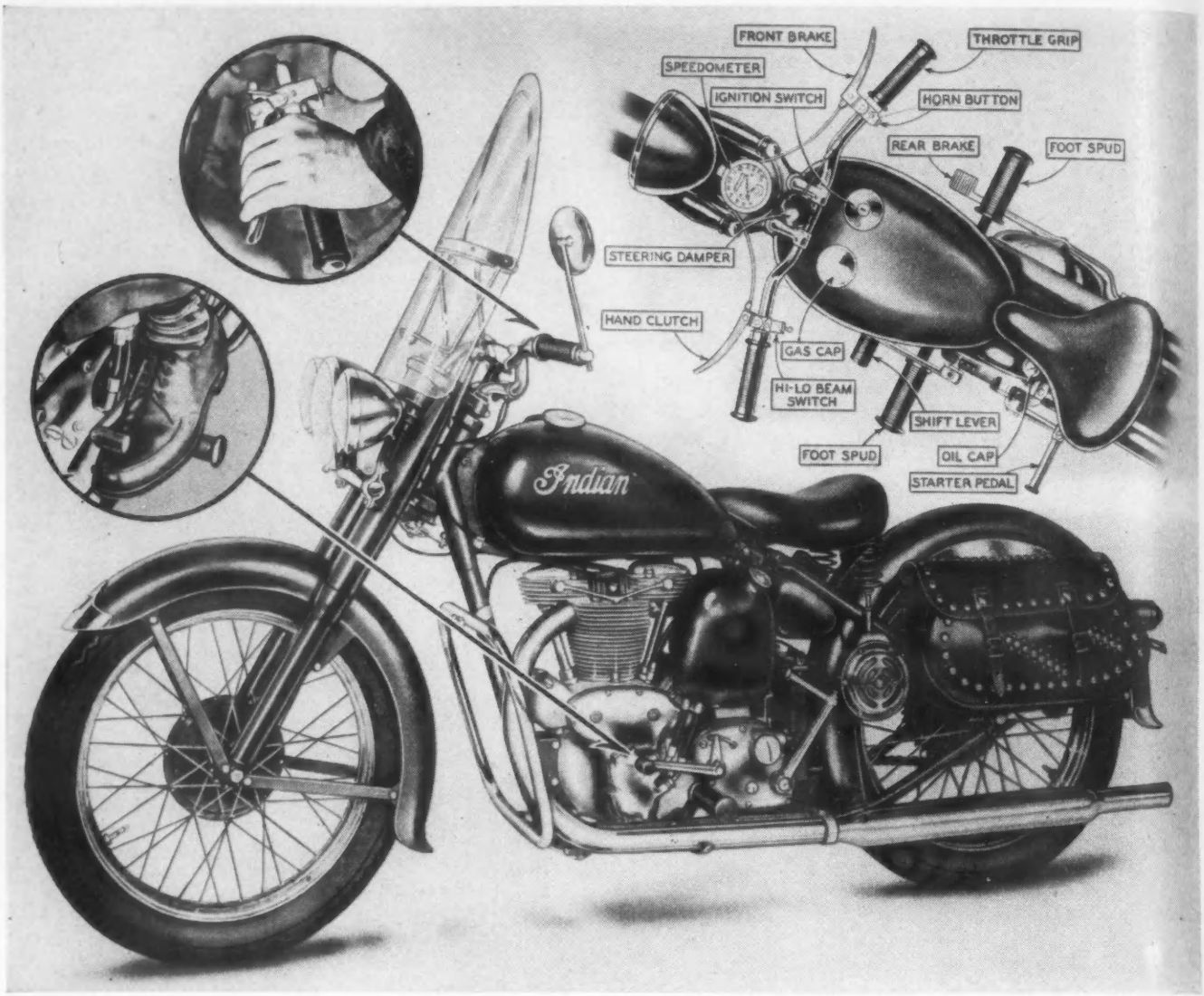
The larger of the supersonic tunnels is 70 ft long, with a maximum diam of 54 in. It is powered by electric motors capable of developing 4200 hp. This tunnel was designed to test some of the large single components of jet engines, or assemblies of two or three related items, depending on the size and nature of the items and the type of test involved. It also can be used with vacuum pumps, which then permit the handling of 115,000 cu ft of air per min. This amount of air is roughly equivalent to the emptying of 32 standard railroad boxcars (each containing 3600 cu ft of space) of air per min. When a compressor blows the air through the tunnel, 2.66 tons of air can be handled per min.



Installing a gas turbine aircraft engine on a thrust-measuring stand.



Some of the instruments and equipment for photographing air flow phenomena are seen in this closeup of one of the supersonic wind tunnels. Glass panels, each nearly an inch thick, permit the camera, mounted on the heavy beam in the right foreground, to picture air travelling at supersonic velocities. Known as the Schlieren method, this apparatus produces "shadow photos" which reveal the pressure waves encountered in supersonic air flow.



Two Lightweight Indians

NEW lightweight motorcycles of unusual design are now in production at the Indian Motocycle Company's factory at Springfield, Mass., and will soon be in the hands of dealers throughout the country.

This year's Indians are entirely new and different and do not resemble any motorcycle ever built in the United States. There will be a new model of the big 74 cu-in. machine early in 1949, but the real innovations are incorporated in the two new lightweights.

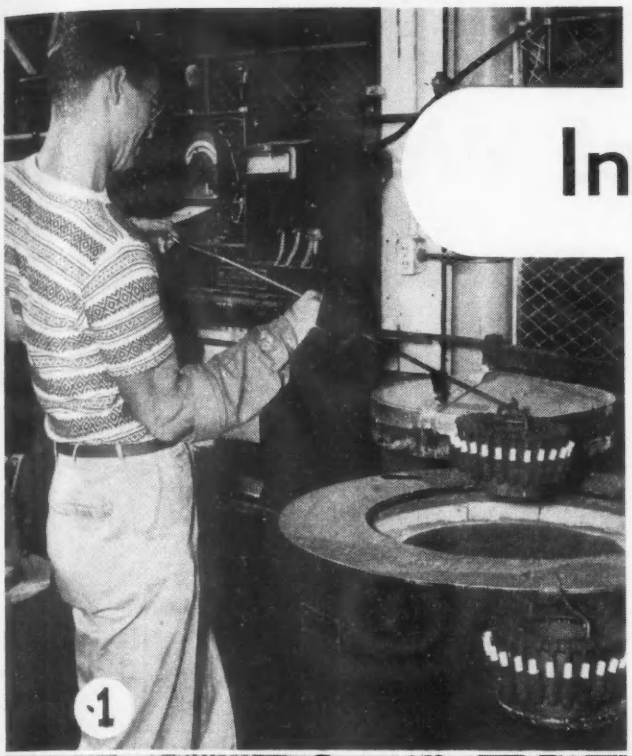
The machines of this series are the "Arrow", which is equipped with a single cylinder engine of 13.3 cu-in. displacement, and the "Scout", with a 26.6 cu-in. "vertical twin" engine. Both motorcycles have hydraulic front forks with five-in. travel, and are equipped with hand clutch and foot shift. Both have three-speed transmissions with overdrive for high speed. The engines are of overhead-valve design and are said to possess a horsepower-to-weight ratio that never before had been achieved in such power units.

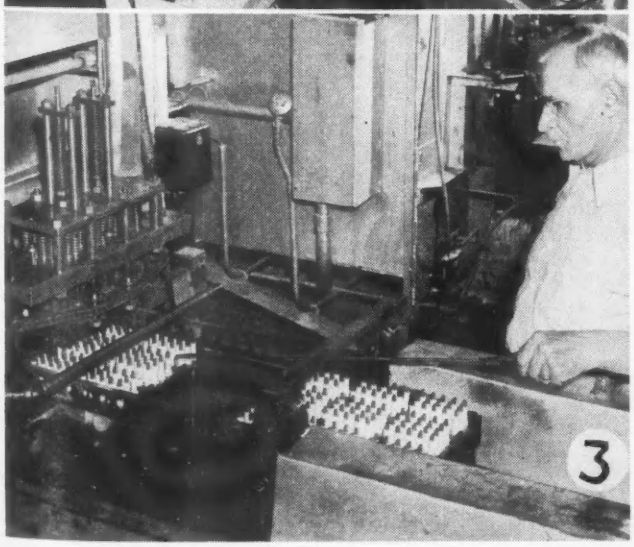
The single cylinder Arrow cruises at 60 mph, going almost 100 miles to the gallon of gasoline. The Scout, with its vertical twin engine, has an as yet undertermined top speed somewhere in the 90's. Both have an extremely low center of gravity. The Arrow weighs 240 lb and the Scout 275 lb. They are only "lightweights" in comparison with the 600 lb machines that have so long been the characteristic product of American manufacturers. The Indian Motocycle Co. manufactured 11,000 "Chiefs" in 1947 and considered that a better than average year. It will build 25,000 Arrows and Scouts in the next 12 months and expects to build almost twice that number in 1950. The motorcycle shown above is the "Golden Arrow", a de luxe version of the single-cylinder machine.

Ingenious Fixtures

for Making

New Spark Plug





An entirely new sub-assembly and assembly department, enquipped with ingenious fixtures, has been placed in operation by the AC Spark Plug Division of General Motors at its Dort Highway plant in Flint for making a new type aviation spark plug, which is now in volume production. Precious metals and insulator of the sapphire family are incorporated in this spark plug.

The bore of the insulator is filled with silver, centrifugally cast in place, which serves to conduct away the terrific heat to which the "business end" of the plug is exposed in operation. The patented insulator is made of aluminum oxide, called Corundum. The insulation for the core and shielding barrel is of one-piece construction. The electrodes are made of platinum.

1—After the platinum electrodes and silver have been placed in the insulators, they are heated in a furnace. When the silver has reached the molten state, a basketful is removed and placed in a fixture and spun at a high rate of speed, forcing the silver solidly into the tip of the insulator.

2—Once the insulator is in place the shell and shield are welded into a one-piece unit on this special welding fixture. The operator is applying flux preparatory to welding.

3—To complete the gas tight glass-seal in the spark plugs, the insulators are passed through special electric-heated furnaces, melting the copper and glass compound. As the insulators emerge from the kiln, heated to a cherry red, the center wires are driven into place by a spring force. The operator is pulling a tray of insulators away from under the driving head.

Short Run Dies of Wood, Glass a

By Walter Rudolph

EXPENSIVE steel dies are often supplanted by much less costly wood, wood-and-glass, and more recently, concrete-and-glass dies for short-run presswork. One of the most notable exponents of the latter type die is the Flxible Co., Loudonville, Ohio. Experimental die construction of this nature is now giving way to regular concrete-and-glas die usage, rather than that of wood, and wood-and-glass.

The use of hardwood dies for short-run forming and drawing is an old practice in some branches of industry. For years Flxible has fabricated such dies for making, principally, funeral coach and ambulance body panels. The comparatively small number of units produced between changes in body styling necessitates low original die-making costs.

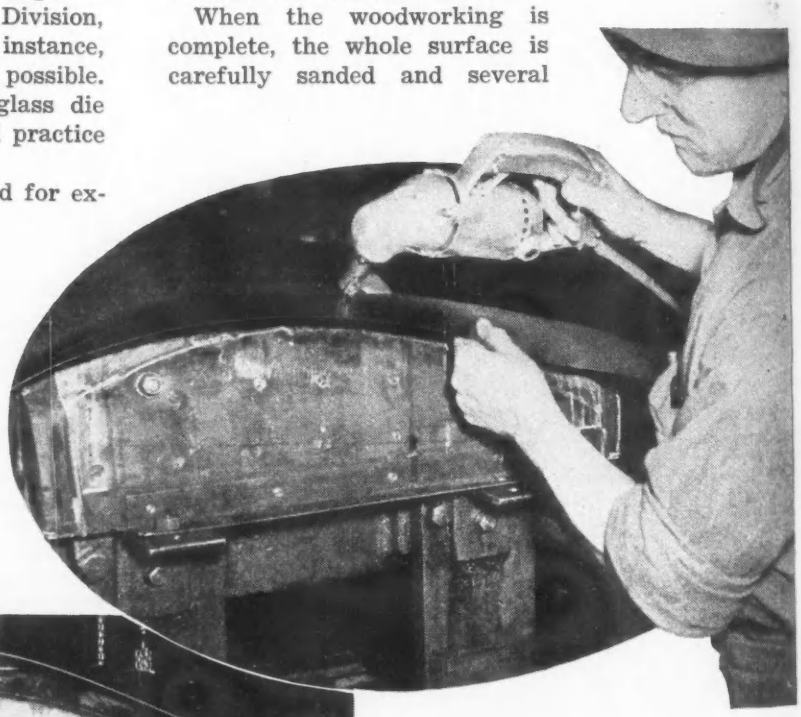
The contrast in die-making costs runs as much as $60 compared to $1100, concrete-and-glass compared to tool steel, according to Franklin Warner, superintendent of Ambulance and Funeral Car Division, Flxible. Although this is an exceptional instance, the comparison gives an idea of the savings possible. Before noting the details of concrete-and-glass die construction, we might review the years-old practice at Flxible of hardwood die-making.

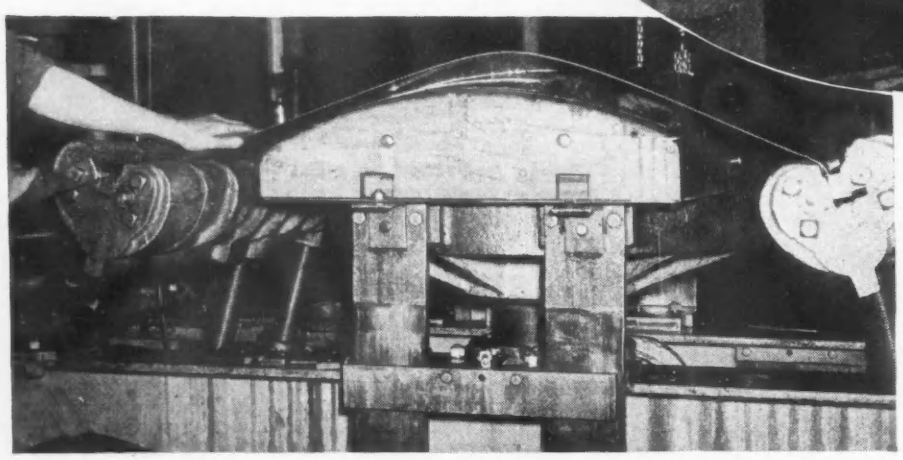
Hundreds of such dies have been produced for exterior panel work. Sizes vary, but average about 40 by 48 in. They are used on 14 to 20 gage sheet steel forming and drawing, presswork being done on three hydraulic ram-type machines. Rubber pressure pads are commonly used in conjunction with such dies to compensate for the lack of double action.

Flxible buys the best kiln-dried maple obtainable from native lumber mills for hardwood die construction. Pieces come in dimensions of about 2 in. by 12 in. by 12 ft, and with drawing surfaces free of knots. The maple strips are cut to size and joining surfaces are painted with a cold glue. The glued blocks are clamped together and held overnight, or longer, as required by weather conditions, and are then unclamped. From here on a great deal of highly skilled woodworking craftmanship is involved. Flxible employs men who can work from lofted or engineers' drawings to shape up or surface the dies.

Tools involved in this manual work are block planes, chisels, mallets, spoke shaves and so forth. The block of glued maple is divided into craft lines, about five inches apart, horizontally, and similarly, vertically. Metal templates for each craft line are made to aid the woodworking. After the die is roughed out, the templates are used to bring surfaces to the exact contours.

When the woodworking is complete, the whole surface is carefully sanded and several





A maple die, reinforced with steel bolts and surfaced with a Fiberglas covering, is forced into a contoured body panel for a funeral car.

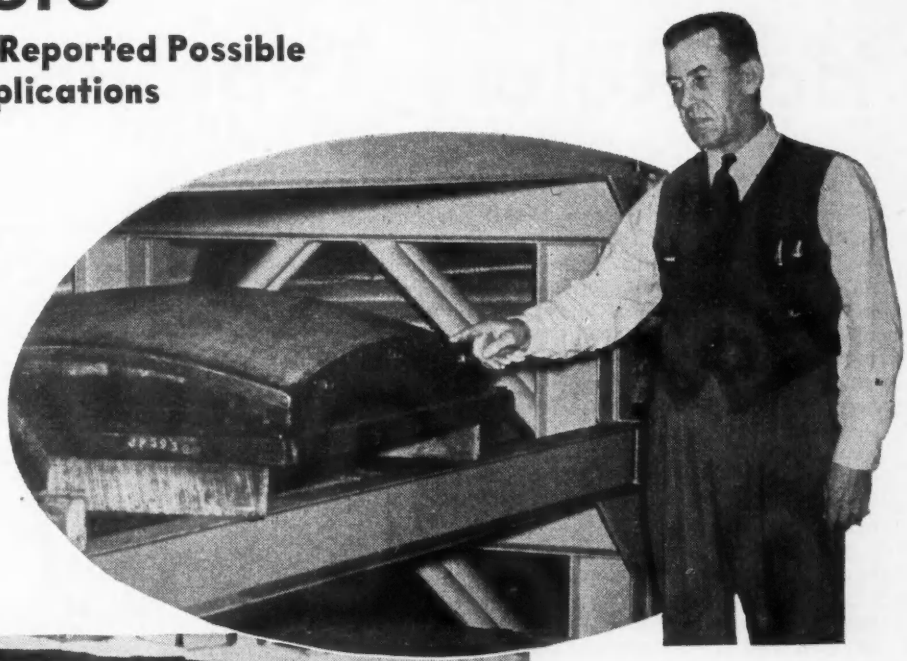
After the steel sheet is formed over a maple die, it is trimmed by means of a portable electric shear.

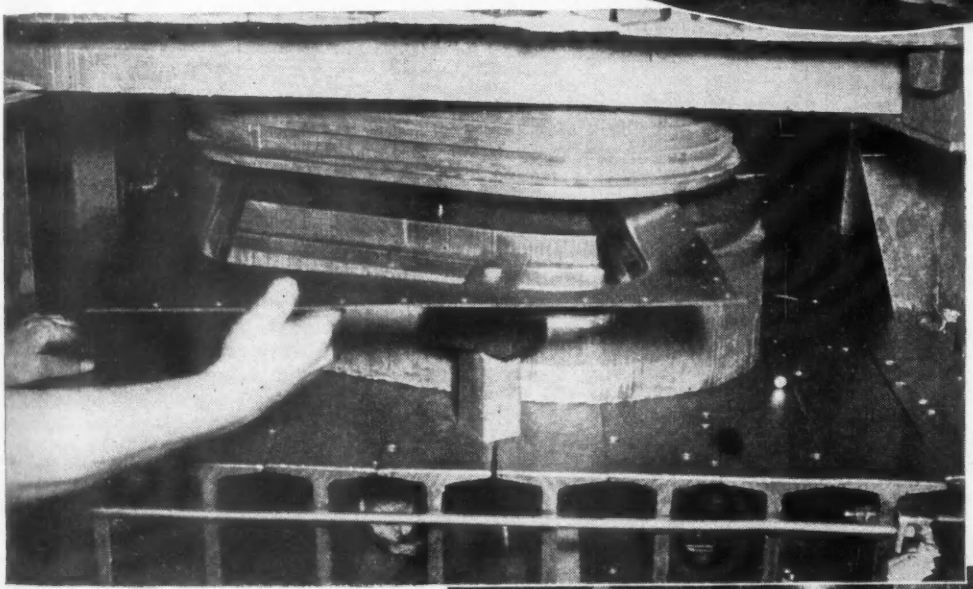
and Concrete

Large Savings Reported Possible in Suitable Applications

coats of orange shellac are painted on to give a hard, smooth finish. The die is now ready for press use. Some dies require steel inserts to aid more accurate drawing where window flanges must appear in the pressed panel, for instance. This woodworking procedure produces dies that average about $400 in cost.

Maintenance of maple dies is the problem (*Turn to page* 88, *please*)





An edge reinforcement reduces maintenance on this glass-covered maple die.

A steel insert is required in the hardwood die for producing window panels. The sheet metal was blanked to size before drawing.

Here is a glass-covered concrete die. It requires practically no maintenance.

New Hydraulic Pump Has Rotary Type Pistons

THE desirability of a positive displacement pump giving 360 deg of continuous pumping free of noise and pulsation has long been recognized. A line of hydraulic pumps said to combine these qualities has recently been developed by Berry Motors, Inc., of Corinth, Miss. They are made in a number of sizes for such applications as hydraulic speed reducers, automatic hydraulic clutches, variable speed transmissions, and other uses.

The operation of the Berry pump is shown in Fig. 1. Two or more pistons, co-acting with their abutment valves in circular cylinders, are used in each unit as a means of positive displacement. In this manner, the properly-timed pistons acting on the same shaft, result in the continuous uninterrupted flow of the fluid. Fig. 2 shows a cutaway view of the pump itself.

The main shaft and abutment valve shaft of the unit are supported by antifriction bearings, and since rotating parts do not actually contact the housing, frictional losses are extremely low. In addition, the method of pressure balancing of the moving parts assures maximum efficiency, according to Berry engineers.

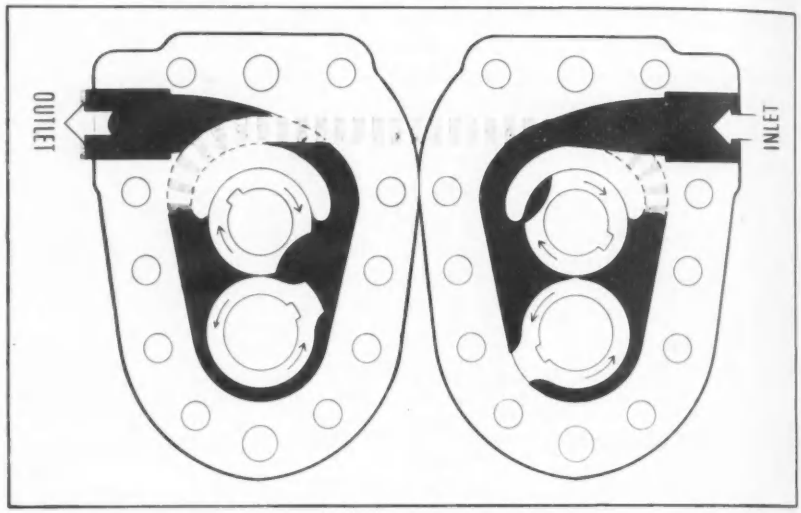


Fig. 1 Schematic diagram of Berry two-stage pump and motor, illustrating means by which continuous flow of fluid is obtained. The two stages are shown side by side for easier visualization. In the actual unit they are arranged in line.

Because of its unique design, the Berry unit may be employed as a motor having the same low-friction, pressure-balanced features as when used as a pump. Under normal operating conditions, these units are 100 per cent reversible and will operate over a wide range of speeds. Among the possible applications for pump and motor combinations are: spindle and feed drives for machine tools, marine reduction and reverse units, and automotive drives.

In addition to the hydraulic pumps and motors, Berry is also making an air-powered motor which operates on practically the same principle as the hydraulic unit. The principal difference is in the arrangement of the pistons and abutment valves. Regardless of the horsepower, all Berry air motors have three balanced stages. Air enters the first stage, drives the piston in this cylinder through its power stroke, passes to the next cylinder, continues to expand, and successively drives the second and third pistons through their power strokes. An adjustable bypass valve between the inlet and second stage provides for additional torque at low speeds.

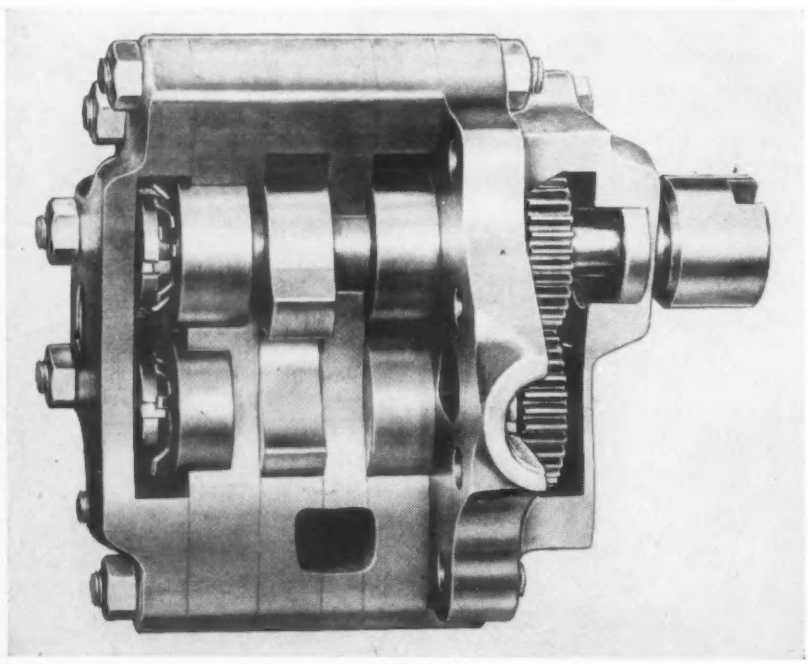


Fig. 2 Cutaway view of Berry hydraulic pump and motor.

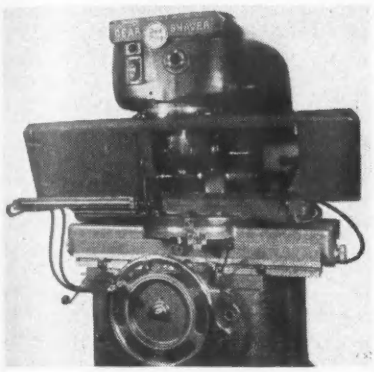
NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

M-20—Two New Helps For Gear Shaving

Red Ring engineers, National Broach & Machine Co., Detroit, Mich., have just brought out two new developments for gear shaving machines said to materially reduce operator effort and fatigue and increase production.

One of these is the "fast-lock" tailstock which reduces the operation of loading and unloading the work to just one motion each. A new screw advance and locking mechanism permit the operator to lock the work by pushing the handle away, and to retract the tailstock for unloading by pulling the handle toward him. As soon as the center is seated in the arbor or part, it locks positively, with no necessity to jam the handle to secure locking.



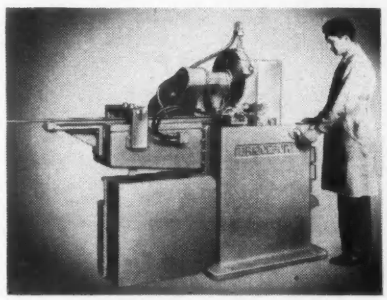
Fast locking tailstock for gear shaving machines.

The second development is the air actuated electrically controlled automatic splash guard available in several designs. With this device, after loading the work, the operator presses the start button which automatically closes the door and starts the coolant and cutting cycle. The cutting cycle is carried on automatically and when terminated, the coolant is shut off and the door opens automatically, leaving the finished part ready to be unloaded.

M-21—Automatic Cut-Off Machine

The Bridgeport Safety Emery Wheel Co., Stratford, Conn., is marketing a new fully automatic abrasive cut-off machine designed for high speed cut-off of stock up to 2 in. square, to lengths ranging from ½ in. to 12 in. Steel, brass, plastics, porcelain and practically all materials used in industry are said to be cut with speed and accuracy on this Model 51.

The head assembly which consists of an 18 in. abrasive cut-off wheel driven through V belts by a 10 hp motor is mounted on a rocker shaft running in Timken bearings and is actuated by a hydraulic cylinder which feeds the wheel in and out of the cut. The hydraulically operated feed mechanism is synchronized with the cutting head and automatically feeds a predetermined length of stock into position where it is gripped by a holding vise. After the cut has been completed the wheel withdraws, the feeder returns to normal position and the cycle is repeated automatically until the stock is exhausted or the machine is stopped by the operator.



Automatic abrasive cut-off machine of the Bridgeport Safety Emery Wheel Co.

M-22—Automotive Crankshaft Driller

A special purpose machine has been designed and built by Snyder Tool & Engineering Co., Detroit, Mich., to combine drilling, counterdrilling, chamfering, tapping and reaming operations on automotive crankshafts and to maintain accurate relationship to holes thus processed.

Two slide units having 18 in. of feeding stroke move on hardened and ground ways. Tools are carried in multiple spindle heads powered by one 10 hp and one 7½ hp motor. A Geneva indexed six-station trunnion fixture mounted between the heads is powered by a 2 hp motor. Five stations are working positions and one is for loading and unloading.

The stem end of the crank is drilled, counterdrilled, reamed and tapped. The flange end has six flange holes drilled and chamfered and three holes drilled, chamfered and reamed. The large center locating hole in the flange is drilled to depth in two passes and then combination counterbored and reamed. Drills are run at 60 surface feet a minute, reamers at 40 feet a minute and the tap at 30 feet.

The tapping operation is performed by a lead screw tapping unit mounted on the trunnion housing proper. The tapping spindle drive is mounted in ball bearings but the spindle drive proper is carried by the lead screw nut to assure proper tap lead. All other spindles are mounted in ball bearings and are made of alloy steel. All tools are mounted in standard adjustable holders.

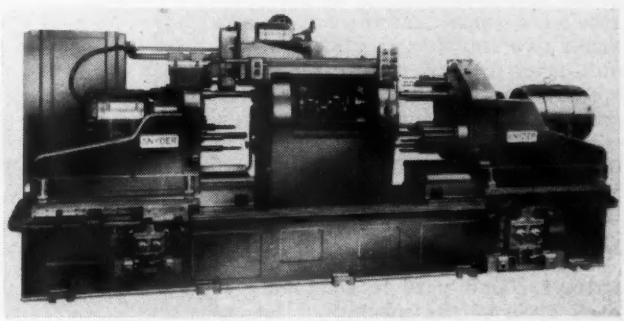
Production rate is said to be 65 machine cycles an hour at 80 per cent efficiency. Floor space is approximately 60 in. by 170 in.

Work-holding fixtures are accessible through both the opening in the housing at loading position and a large opening in the rear.

M-23—Milling Machine For Cylinder Blocks

A special Rigidmil, designed and built by Sundstrand Machine Tool Co., Rockford, Ill., automatically mills both ends and the main bearing faces of an automotive cylinder block with a single clamping of the work. Combining the machining of these surfaces into one operation not only reduces the handling time, but by using the same location of the part, the ends and the bearing faces are accurately machined in relation to each other.

Two 15 hp horizontal, single



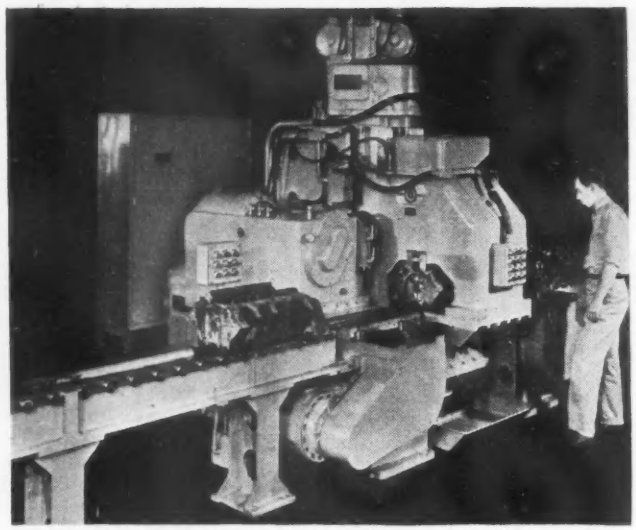
Snyder special machine for operations on crankshafts

spindle heads have tranverse feed on slide-ways at both ends of a rise-and-fall-fixture to face-mill the ends of the block. A 7½ hp head mounted in the machine base drives an arbor with cutters for straddle-milling the main bearings.

The conveyor-fed block enters the loading position on a hydraulically operated shuttle. In an automatic cycle, started by a push button, the block is shuttled into the rise-and-fall-fixture where it is hydraulically clamped. The two opposed horizontal heads feed simultaneously to face-mill both ends of the block. At the end of the stroke, the cutters retract and the heads return. The fixture then feeds downward for the straddle-mill operation on the main bearing faces. When completed, the fixture rises, releasing clamping pressure and ending the cycle. At the start of the next automatic cycle, the finished block is shuttled out of the opposite side of the fixture as another rough block enters.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

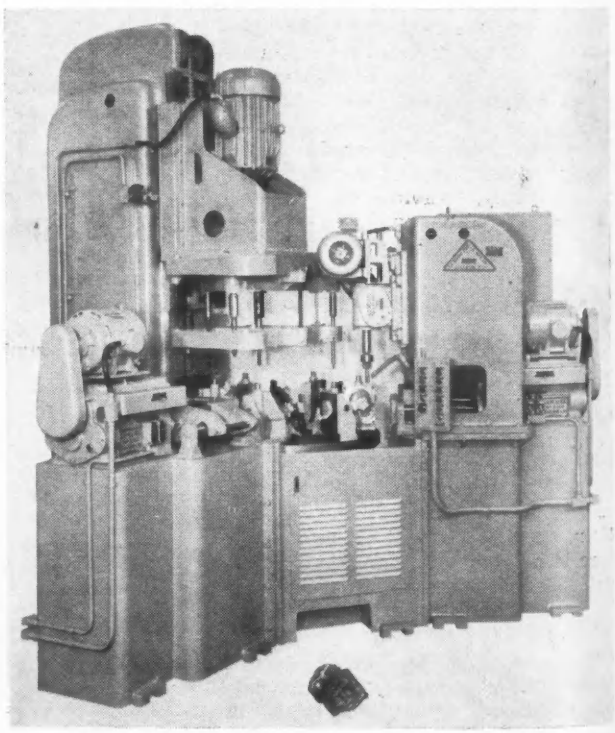


Special Sundstrand machine for milling operations on automotive cylinder blocks.

M-24—Automatic Drill For Rear Bearings

A machine recently designed by the Le Maire Tool and Mfg. Co., Dearborn, Mich., is being used to drill, spotface, ream, countersink and tap 7 holes in approximately 138 automotive transmission rear bearing retainers per hour. For each operation three different types of units have been combined: a vertical-machine slide-type drilling unit to provide wide support for the four spindle head; two small horizontal twin-ram quill-type drilling units with single spindles; and a small vertical lead screw tapping unit with single spindle. These are mounted on a fabricated steel frame and are grouped around a 36 in. dia six-position automatic indexing table having hydraulic indexing mechanism.

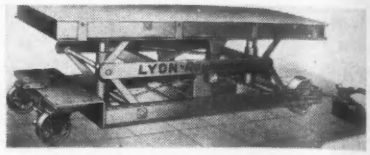
The table carries six quick-acting fixtures. One part is completed at each cycle of the machine. Coolant is pumped from a tank built into the table base. A single push button operating the automatic cycle is pressed as soon as a part has been loaded. Other buttons controlling separate heads are used in setting up the machine.



Le Maire machine for operations on transmission rear bearing retainers

M-25—Hydraulic Sheet Feeding Table

Lyon-Raymond Corporation features a new design in their standard 10,000 pound capacity portable hydraulic sheet feeding table, double cylinder type. The new unit incorporates use of two vertical hydraulic cylinders synchronized by a toggle lever arrangement. Faster and more constant elevating speed and easier operation has been effected, it is claimed.



Portable hydraulic sheet feeding table

The table top remains level at all times even under off center loads.

Specifications of the standard table consist of a capacity of 10,000 pounds; platform is 36 in. by 96 in.; lowered height, 22 in.; elevated height, 34 in.; elevation, 12 in. The unit has floor lock, towing eye, and two-speed foot pump with 5 ft hydraulic hose; two 8 in. diameter Timken Bearing swivel casters, and two 12 in. diameter ball bearing wheels.

Optional extras include extensions which provide platform widths to 60 in. and lengths to 144 in. The table can also be equipped with either a two speed hand pump or a ¾ hp motor-driven pump operated by push button or pedal type switches.

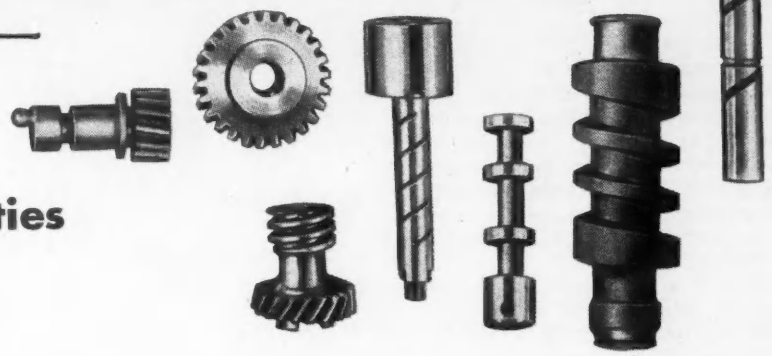
(*Turn to page 84, please*)

if you want the best in—

✓ machinability

✓ heat-treating properties

✓ physical properties



There's more to J&L Jalcase Steel than a grade number. That's why, if you want the best, you must specify "J&L JALCASE."

- It is the *original*, free-machining, open-hearth steel.
- It still is the outstanding steel in its class today.
- Its machining properties closely approach those of Bessemer steel.
- It machines with a fine finish.
- It is easy to heat treat by conventional and high-speed induction methods.
- It lengthens tool life.
- It reduces production costs.

Jalcase is available in a range of grades to suit a wide variety of applications. It is supplied as cold-drawn or cold-drawn-with-metallurgical-processing, which includes special tempering treatments. Thus many parts made of this material may need no further heat treatment after machining.

Typical Jalcase analyses are found in the A.I.S.I. 1100 series wherein the manganese content is 1.00% to 1.65%, such as in Grades C-1117 through C-1144.

Let us send you complete information on J&L Jalcase—the *modern* free-cutting steel. Write to: Jones & Laughlin Steel Corporation, 430 Jones & Laughlin Building, Pittsburgh 30, Pa.

JONES & LAUGHLIN STEEL CORPORATION

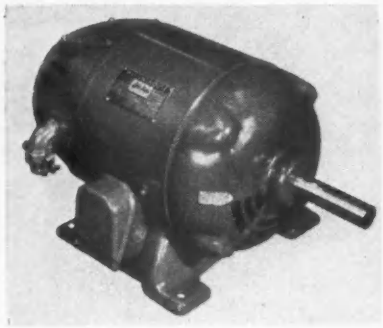
AMERICA'S FOREMOST PRODUCER OF FREE-CUTTING, QUALITY-CONTROLLED STEELS

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

P-29—Drip-Proof Induction Motor

A new wound-rotor Life-Line induction motor of open drip-proof construction is available from Westinghouse Electric Corp. in ratings of 1 to 15 hp, frames 203 through 326. The Type CWP wound-rotor motors may be used wherever adjustable speed is required, or where high-starting torque with low-starting current is necessary. Especially useful for driving compressors, plunger pumps, positive pressure blowers, ventilating fans or for bringing heavy loads up to speed, the motors feature quiet operation.



Westinghouse wound-rotor induction motor.

Brushes for this motor—type CWP—are made of electro-graphite or metal graphite depending on service requirements. Brushholders are of the sliding box type with adjustable spring tension. They are mounted on steel bolts with Micarta spacers. The collector rings are molded solidly into a Moldarta insulation bushing that is pressed on the shaft.

Rotor core consists of punchings riveted into a solid structure and held on the shaft by a shrink fit. Rotor windings have coils threaded into partially enclosed slots.

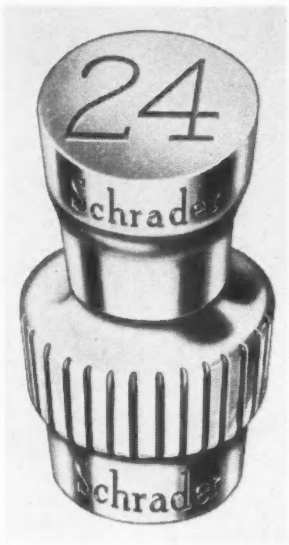
Motors are available for 60, 50 and 25 cycle; two and three phase; 208, 220, 440 and 550 volts; 1750, 1160, 870, 690, 580 rpm for 60 cycle; 1450, 965, 715, 580, 485 for 50 cycle; 1450, 750, 485 for 25 cycle; 40° C rise, continuous open-constant speed.

P-30—Pressure-Telling Valve Cap

As an aid to accurate and correct inflation for all tires, in the extra low pressure tire program, A. Schrader's Son, Brooklyn, N. Y., announces the new Pressur-tel valve cap.

When a set of these air-sealing Pressur-tel caps are installed on the tire valves, dealers, service men and motorists need no longer be doubtful about the pressure to be carried in tires.

Since the correct pressure for the tire is stamped on top of the Pressur-tel cap in numbers almost ¼ in. high, all the service attendant or motorist has to do is glance at the number and inflate the tire accordingly.



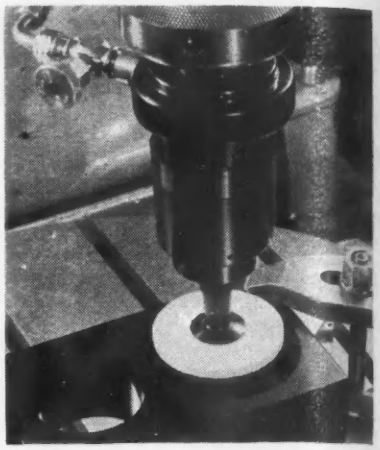
Schrader valve cap shows correct tire pressure.

P-31—Jig Grinding Attachment

The Vulcan Tool Co., Dayton, Ohio, offers a new Vulcanaire, (series 20,000) as a companion to the 65,000 rpm (series 10,000). The original Vulcanaire was designed for jig grinding holes in hardened steel with diameters from 1/16 in. to 1½ in. The second Vulcanaire is designed for accurate jig grinding in the 1½ in. to 4 in. diameter range.

The 20,000 series comprises an air driven attachment which can quickly and economically convert jig borers and other machine tools into precision jig grinders.

Both of these Vulcanaires are equipped with the same interchangeable special adapters to fit into the chuck of any machine tool on which jig grinding operations are desired. Both use the same standard and interchangeable accessories consisting of a portable stand on which is mounted an air cleaner, regulator, gage and oiler, and a complete dust collecting system.



New Vulcanaire of the Vulcan Tool Co.

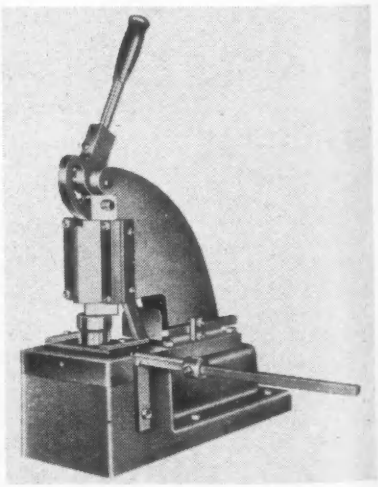
P-32—Double Purpose Punch

The new Di-Acro punch developed by the O'Neil-Irwin Mfg. Co., Lake City, Minn., is a double purpose machine employed for rapidly perforating holes of various shapes and sizes as large as 4 in. in diameter, and also for blanking, drawing, embossing and forming.

The powerful action of this precision machine is obtained through a roller bearing cam which converts a small amount of operator effort into multiple pressure at point of impact.

A feature of the Di-Acro punch is its triangular shaped hardened and precision ground ram. Since turning or twisting of this triangular ram is impossible, the position of the punch head is positively controlled for perfect alignment at all times.

The punch performs either primary or secondary operations on parts being processed through the Di-Acro system of Die-Less Duplicating.



O'Neil-Irwin's new Di-Acro punch.

Another Special Machine by Cross

Handling Reduced
by Machining Parts in Clusters!

How intricate production problems can be solved by combining ingenuity with experience in creating machine tools is aptly illustrated by this new special Cross machine.

Four Valve Rocker Shaft Brackets are cast in one piece for easier machining and handling. Two clusters of four parts are handled at each of the seven stations. A net total of 480 parts are drilled and reamed per hour.

This extraordinary piece of equipment again proves that one of industry's best investments today is the modern machine tool specially designed to meet specific requirements. Whether your production is large or average, it will pay you to "Consult Cross to Cut Costs."

PART: Valve Rocker Shaft Bracket.

OPERATION: Drill and ream 10 holes.

PRODUCTION 480 pieces (120 sets) per hour at 80% efficiency.

EQUIPMENT: Cross Seven-Station Combination Drilling and Reaming Machine.

FEATURES: Seven-station, power-operated index table ☆ Independent station for loading and unloading work while machine is cutting ☆ Twelve clusters machined at one time, progressively, in six working stations ☆ Flexibility for part design changes through use of standard Cross columns, heads and index table ☆ Hardened and ground steel ways ☆ Hydraulic feeds ☆ Low maintenance because of many standardized parts, accessibility of wearing parts and interchangeability of self-contained units.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE CROSS COMPANY

Established 1898

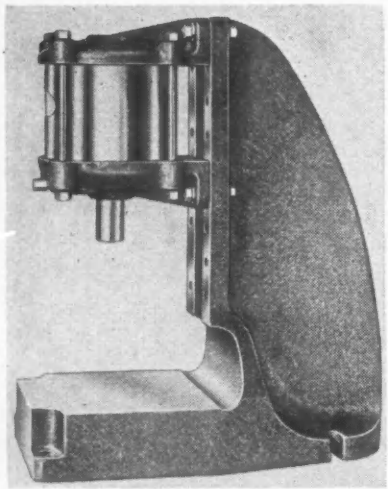
SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

P-33—Air Power Arbor Press

A "Controlled-Air-Power" arbor press has been added to the line of the Bellows Company, Akron, Ohio. Designated the Bellows model BAP-20 "Controlled-Air-Power" arbor press, the new unit is suitable for



Bellows controlled air power arbor press.

light to medium pressing operations such as forming, flaring, stamping, crimping, riveting, etc., as well as light broaching operations.

The arbor press is powered by a 5½ in. core Bellows air cylinder, developing a thrust of approximately 20 times the operating air line pressure. The press may be used on any line pressure ranging from 5 to 175 psi. The air cylinder has a built-in speed control valve which permits infinite variation in the speed of the advance stroke. Stroke length is adjustable from a fraction of an inch up to 2½ in. maximum. Maximum clearance of the 1¼ in. diameter ram shaft is 7 in. The position of the air cylinder is adjustable vertically in steps of 1½ in. Table size is 8 in. by 9 in. with a throat clearance from the center of the ram of 5 in.

The arbor press can be operated with hand or foot control valves, or safety controls of either the pneumatic or electrical type.

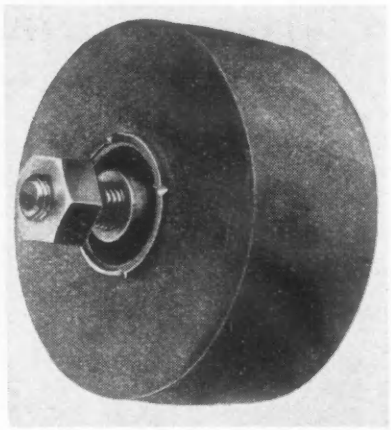
P-34—Conveyor Roller

A new rubber conveyor roller is being made by the Wolverine Tool Co., Detroit, Mich., claimed to protect metal panel work and other production items from costly dents and scratches on conveyor lines.

The neoprene rubber is oil and abrasion resistant and provides a firm support, yet is soft enough to conform to contours and absorb shocks. Wolverine rollers are 4 in.

NEW ★ PRODUCTS

For additional information regard.ng any of these items, please use coupon on page 56

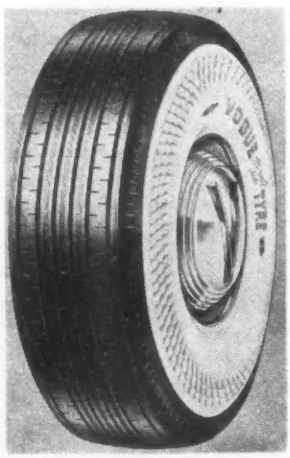


Wolverine rubber conveyor roller.

dia by 2 in. wide and are provided with 2 free rolling ball bearings, mounted with standard ½ in. bolt and nut assembly.

P-35—White-Wall Premium Tire

The Vogue Rubber Co., Chicago, Ill., has achieved full production on its new premium white-wall tire employing the extra low pressure principle.



Vogue premium white wall tire.

Known as the Vogue Miracle Ride Tyre, a high safety factor is said to be provided by using high tenacity cord which insures a carcass strength claimed 50 percent greater than in ordinary models.

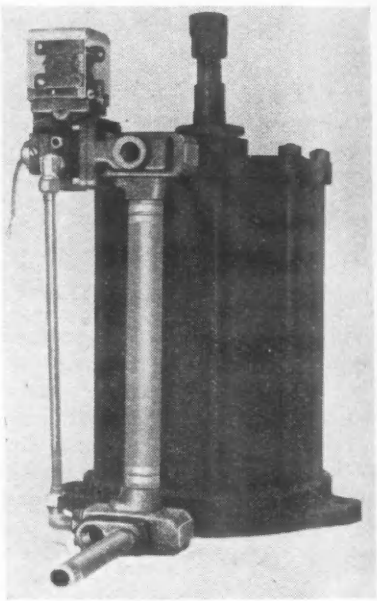
Individual cords are insulated by a surrounding cover of pure natural rubber to minimize effects of heat, impact and flexing. Double nylon breaker strips supply protection against heavy impact shocks.

Heavy styling emphasis is achieved through use of special hand engraved molds resulting in the prismatic effect illustrated.

P-36—Air Cylinder Control Unit

A new approach to the control of air cylinders which provides individual control units to be applied directly to the cylinder heads, has been achieved by Numatics of Milford, Mich.

The control units are simple, full capacity 3-way valves to be screwed directly into the pipe connections



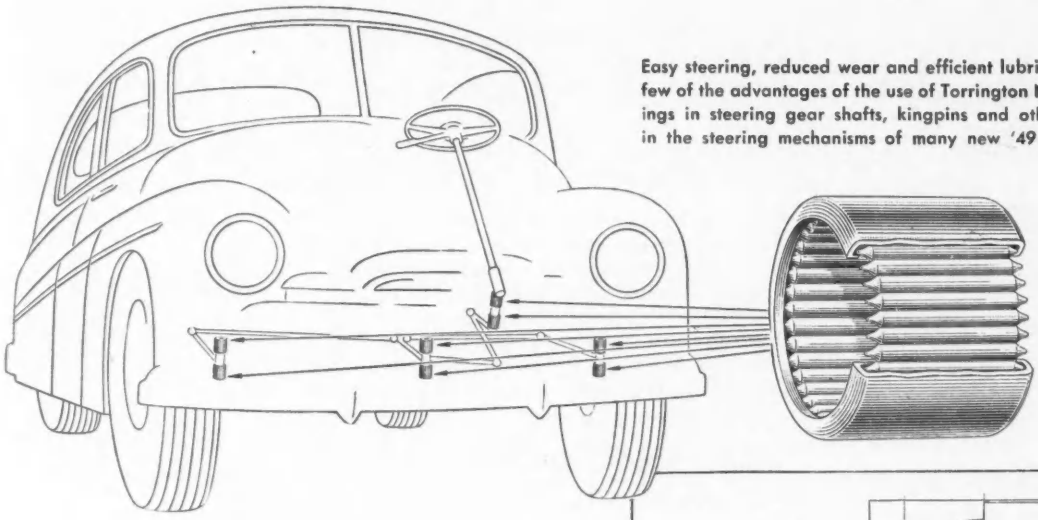
Numatics air cylinder control unit.

of any air cylinder. The hook-up eliminates all hose or pipe, except the one for the supply and a small connector.

By adopting this type of individual unit, it is said users can select their own control for solenoid, combinations of double solenoid, hand, foot, cam, or sequence operation, of either old or new cylinders. Control can be at the cylinder or from a remote location using ¼ in. tubing or hose from the operating station. Speed can also be controlled by throttling at the individual exhausts.

Units are available in pipe sizes, ½ in., ¾ in., 1 in., and larger.

Designed for Efficiency with Torrington Needle Bearings



Easy steering, reduced wear and efficient lubrication are a few of the advantages of the use of Torrington Needle Bearings in steering gear shafts, kingpins and other elements in the steering mechanisms of many new '49 model cars.

... fabrication and assembly economies are also realized with these low-cost anti-friction units.

SMOOTHER, easier steering is only one of the sales-compelling features built into many new '49 model cars through the use of Torrington Needle Bearings in steering and other front-end mechanisms. The high capacity and efficient lubrication of these modern anti-friction units also mean better all-round service ... longer life ... lower maintenance expense.

The compact, unit construction of Needle Bearings contributes to greater assembly-line efficiency, too, saving space in design, simplifying component elements, and thus speeding fabrication and installation. Similar advantages are secured by the use of Needle Bearings in automotive equipment, aircraft, farm machinery, machine tools and home appliances.

Torrington's engineers will gladly help you apply Needle Bearings to improve the operation and increase the life of products you build or use. Call or write the nearest Torrington office.

THE TORRINGTON COMPANY
Torrington, Conn. • South Bend 21, Ind.
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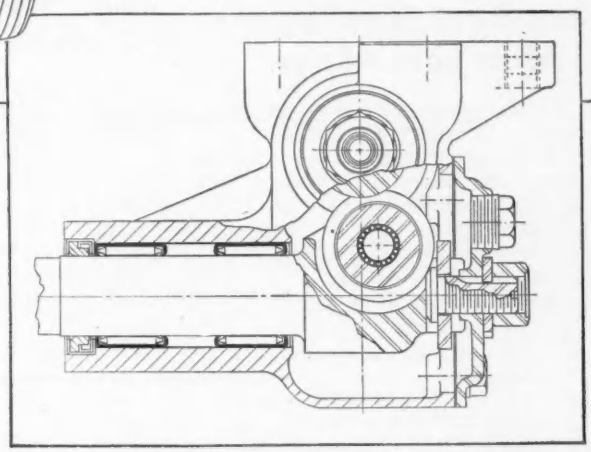
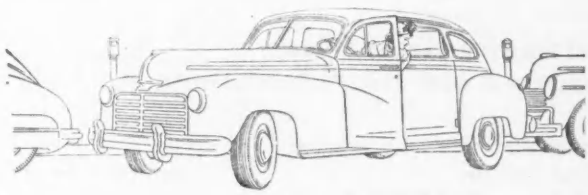


Cross-section drawing shows how compact Needle Bearings simplify design and provide easier anti-friction operation in steering gear shaft.



Less effort in parking with the new super-cushion tires is especially noted, with better steering always assured by smooth-running Needle Bearings.

TORRINGTON *NEEDLE* **BEARINGS**

NEEDLE • SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • BALL • NEEDLE ROLLERS

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-29X—Plastics

General Electric Co., Chemical Dept.—A new, 15-page illustrated bulletin, No. CDP-578, describes G-E molded and laminated plastics. It is devoted to a description of the design, moldmaking and molding facilities of G-E plastics Div. and discusses G-E sealing caps and sleeves, mycalex, silicone rubber and G-E 1422 high frequency insulation. High and low pressure laminates are summarized along with G-E silent gears, bearings, decorative surfaces, translucent sheets, etc. Property tables are included for reference.

L-30—Spot Welding of Aluminum Alloys

P. R. Mallory & Co., Inc.—A new Technical Information Bulletin on Spot Welding of Aluminum Alloys has been announced. It contains 36 pages profusely illustrated with diagrams, photographs and specification charts. Fourteen chapters cover all phases of the spot welding of aluminum alloys, among which are sections on Surface Preparation, Equipment, Techniques and Testing of Spot Welds, and a collection of other material, including a complete Bibliography.

L-31—Marking Tape

Topflight Tape Co.—A new folder describing the company's pressure-sensitive cellophane and acetate tape printed to specifications, has been announced. Many applications are illustrated and its use in parts marking, coding, labeling, and for making instruction stickers is described.

L-32—Injection Molding Machines

The Hydraulic Press Mfg. Co—Bulletin 4802 gives detailed descriptions of H-P-M injection molding machines and how they operate. A page is devoted to data of special value to production men. The functions of mold clamp, material feed, injection unit, heating chamber, movable die-head and operation system are discussed in detail. Complete specifications of the H-P-M 4, 9, 16 and 40 ounce capacity units are listed in chart form.

L-33—Screw Thread Inserts

Heli-Coil Corp.—A new, 12-page booklet contains the latest design data, tables, applications and illustrations of Heli-Coil Screw Thread Inserts. Ask for Bulletin No. 248.

L-34—Silicone Mold Release Agents

Dow Corning Corp.—A new 16-page booklet describes the company's Silicone Mold Release Agents for rubber and plastics. Information on the general properties of these products is presented, as well as major applications in the fields of lubricating tire molds, and curing bags, and in the lubrication of mechanical rubber goods, etc.

L-35—Stress-Strain Recorders

The Baldwin Locomotive Works—Testing Equipment Dept.—Bulletin 262, a new 32-page catalog of Baldwin stress-strain recorders and strain followers, describes, with pictures and diagrams, the basic principles of the various types of Baldwin recorders; gives the distinguishing features of 24 different records for all common makes of testing machines and de-

(*Turn to page* 64, *please*)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Your Name ..... Your Title .....

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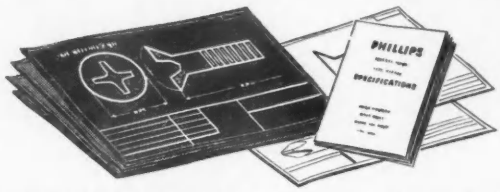
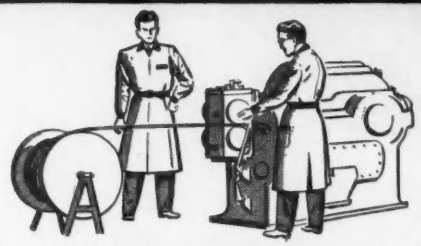
ONLY PHILLIPS RECESSED HEAD SCREWS

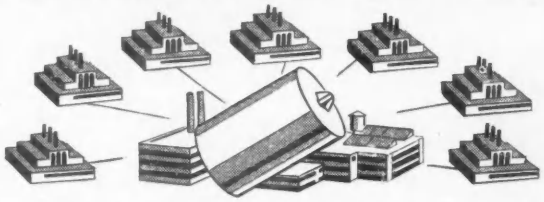
OFFER DIMENSIONAL UNIFORMITY INSURED BY CLOSE ENGINEERING CONTROL



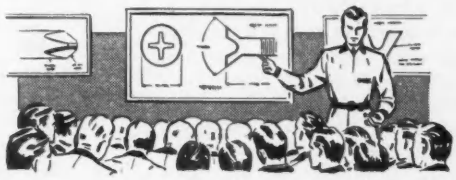
ESTABLISHED STANDARDS . . . Every manufacturer of Phillips Cross Recessed Head Screws is supplied with complete engineering and production data which prescribes precise dimensions and tolerances.



CENTRALIZED PRODUCTION TRAINING . . . And, before production is started on Phillips Screws, each plants' supervisory staff puts in an extended training period with Phillips engineers.



COMMON SOURCE OF RECESS FORMING TOOLS . . . Punches for forming the Phillips Cross Recess in all types and sizes of Phillips Screws are formed from master types at one plant. The manufacture of gauges for maintaining uniformity of Phillips Drivers and Bits are similarly centralized.



ENGINEERS' MEETINGS . . . Standards carefully established at the very beginning are rigorously maintained through meetings of "Phillips Recessed Head Standards Committee". Engineers from all plants meet to exchange ideas, discuss problems and learn about recent developments.

All these precautions to secure absolute dimensional uniformity are just part of the care taken to produce Phillips Cross Recessed Head Screws that give users *all* the advantage of a cross recess engineered for practical production.

Speed and ease of driving in production assembly demands that the driver and recess fit smoothly, perfectly, the same way every time, all the time. With Phillips Screws, you can depend on it.

GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS . . .

GET **PHILLIPS** *Recessed Head* **SCREWS**

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

25 SOURCES

American Screw Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
Elco Tool & Screw Corp.
The H. M. Harper Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Seaboard Screw Corp.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wales-Beech Corp.
Wolverine Bolt Company

GET THIS NEW BOOKLET of facts that prove the top value, top economy of Phillips Recessed Head Screws. It's free . . . use the coupon.

Phillips Screw Mfrs.,
c/o Horton-Noyes Co.
1800 Industrial Trust Bldg.
Providence, R. I.

Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

AA-29

Name _____

Company _____

Address _____

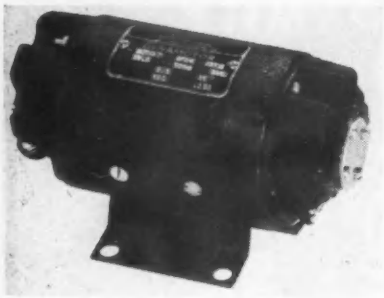
NEW Products for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 56

P-37—Dynamotor For Moble Transmitters

A new dynamotor designed for mobile transmitters and well suited to many marine and aircraft applications, is currently marketed by the Gothard Manufacturing Co., Springfield, Ill.

The dynamotor is said to be particularly adapted to installations where weight and size are important factors. Encased in a steel housing and cast iron brackets, the dynamotor has self-lubricating ball bearings and pressed steel mounting base.

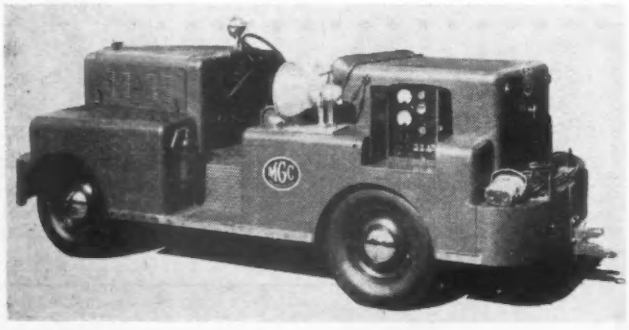


Gothard dynamotor.

Designated Model GP-26, this dynamotor is available in capacities with power output ranging up to 80 watts continuous and 150 watts intermittent duty. Voltage regulation averages 10 per cent, with the unit efficiency about 61 per cent. Weight is 8¼ lb, with height of the unit 4 in., the frame diameter 3½ in., and the length 7¼ in.

P-38—Self Propelled Power Unit

A self-propelled power unit, manufactured by Motor Generator Corp., Troy, Ohio, was especially designed to supply ground power service for airplane engine starting, heating and cooling systems, radio, electronic and other devices, but can be adapted also for power service in other industries. It is now manufactured in two models, the 606 with a 500 amp power unit for servicing DC-6 and similar aircraft, and the 609 or 1000 amp unit for the Boeing Stratocruiser. Either of these units exceeds the power requirements for engine starting. For greater capacity, two MGC "Powermobile" units of like rating will parallel satisfactorily.



Motor Generator's self-propelled ground power service.

P-39—Reversible Aerometers

Lundy Manufacturing Corp., New York, N. Y., is now producing Aerometers of the "ELY" series for intermittent duty operation of wing flaps, cowl flaps, oil cooler flaps, intercooler flaps, ammunition boosters, etc. Aerometers are 1/6, ⅛, 1/10 and 1/20 hp., 12 or 24 volt D.C., with speeds ranging from 200 to 10,000 rpm. They are series wound, reversible, and include a magnetic brake and thermal overload protector. The "ELY" series motors were formerly furnished by the Dumore Company of Racine, Wis.

Lundy aerometer, ELY series.

P-40—Light Weight Tachometer Heads

Small, light weight tachometer heads are now available from Metron Instrument Co., Denver, Colo., for use on standard SAE marine, diesel, and AN aircraft tachometer takeoffs. These type 54 heads can be used with any Metron tachometer indicators to give full scale readings as low as 200 rpm or as high as 10,000 rpm. Weighing only 10 oz, of 2⅛ in. dia and 4⅜ in. overall length, these sealed heads are said to be unaffected by vibration, magnetic fields, or temperature variations over a wide range.

Metron tachometer head.

Heads operate on a contact principle. The head shaft is mounted in permanently lubricated ball bearings.

P-41—New Type Aircraft Hose

A new type of hose that is said to easily withstand the impact of hydraulic power shocks in the operation of newer and larger aircraft is offered by the B. F. Goodrich Co. of Akron, Ohio. The hydraulic power actuates landing gear, flaps and other devices. Tests have shown that the hose takes "far in excess" of the required 3,000 psi, according to the firm. It contains special Swedish steel wire that has a tensile strength of more than 400,000 pounds per sq in.

ARE YOU STILL AN ACTIVE PARTNER . . .

in this "7½ billion-a-year" success?

NEVER was there a partnership like the nation-wide brotherhood of volunteers who have helped sell, advertise, and promote sales of U. S. Savings Bonds! Their program is the greatest sales operation at the lowest cost in history.

Your continued support in promoting the Payroll Savings Plan will help "America's partnership" this year to repeat or surpass last year's four-star performance, in which sales of Savings Bonds were 7½ billion dollars—*exceeding redemptions by far more than a billion!*

So keep up the splendid work—keep on telling and selling your employees the advantages of Payroll Savings: (1) ease; (2) regularity; (3) safety of investment; (4) security for the individual and the nation; (5) $4 for every $3 at maturity! And, remember, people with a stake in the future are the most stable, most productive employees.

For any help you need in conducting the Plan, call on your State Director of the Treasury Department's Savings Bonds Division.

New Savings Bonds Plan won't affect the P.S.P.

THE Treasury Department and the banks of America are making it possible for farmers, doctors, and other self-employed people to participate in "automatic" Bond buying by special arrangement with their banks. This extension of the Savings Bonds program is not a partial payment plan and is intended *only* for people who are not in a position to take advantage of the Payroll Savings Plan.

The Treasury Department acknowledges with appreciation the publication of this message

This is an official U.S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

What the Industry Thinks About "F.O.B. Mill" Steel

(Continued from page 25)

on their shipments and the steel company absorbing part of the freight to distant points. However, it is not worked out that way. In the Detroit area the Great Lakes Steel Corp. has set the price of cold rolled sheets f.o.b. mill at $73 a ton, compared with the previous delivered price of $73.20. Detroit buyers, however, now must pay switching charges averaging about 80 cents a ton, making the net increase 60 cents a ton. The old price of $73.20 included the arbitrary freight charge of $4.20, which theoretically should have been dropped from the new f.o.b. mill price. Consequently, Detroit buyers have to absorb full freight from distant mills, but at the same time have not realized a reduction corresponding to the arbitrary freight at the nearby source.

It is estimated that additional cost per ton of steel bought in Pittsburgh by Detroit buyers will amount to between $4.60 and $5 per ton.

An additional complication under the new setup will be the great difficulty in determining steel costs. Heretofore with delivered prices the same from all companies, it was fairly easy to figure costs of steel going into automobiles in normal times. (Currently steel costs estimates are somewhat complicated by conversion deals, that is, buying ingots or slabs and shipping them elsewhere for rolling into sheet.) However, with steel now coming from sources at varying distances from the plant and bearing different freight charges, the job of computing steel costs per car will be much more difficult.

One problem of the new pricing system that is still not clear so far as the automobile industry is concerned, affects companies which now own outright or have a financial interest in steel producing facilities. Studebaker, late last year, bought the Empire Steel Co. at Mansfield, O. Hudson has a rolling mill subsidiary, Valley Manufacturing Co., at New Castle, Pa. Packard has a financial arrangement under which it obtains part of its steel requirements from a mill in Kentucky. Kaiser-Frazer already has disposed of its Indianapolis rolling mill and its stock interest in Portsmouth Steel Corp., but still has blast furnaces at Provo, Utah. Ford, of course, has the largest steel plant in the automobile industry, producing about 50 per cent of the company's requirements. At various times in the past there have been reports that Ford is planning to dispose of the steel operation, but if such a plan were under consideration it certainly would be deferred now, at least until the ultimate future of the f.o.b. system is clarified. As for steel operations by other automobile manufacturers, these have been considered by industry observers as more or less transient business for the duration of the steel shortage, but the ultimate fate of f.o.b. pricing may have some bearing on what disposition is made of the facilities in the future.

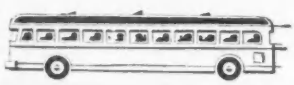
If the steel companies do not decentralize operations into areas of use, the ultimate effect could be disastrous imbalance of steel supplies with the Pittsburgh area, currently by far the largest single producer, having a vast surplus and other areas suffering deficits. It would create a series of local steel monopolies as companies could not compete legally outside their own areas because of illegality of freight absorption. Moreover, it is doubtful if Pittsburgh mills could lawfully lower their mill price to customers in the Detroit area to compensate for freight charges without offering the

(Turn to page 62, please)

If you manufacture...

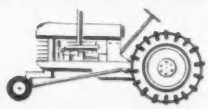
Automobiles

Trucks and Trailers

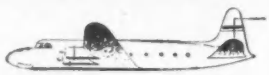


Busses and Trackless Trolleys

Industrial Electric Trucks



Tractors



Aircraft

You can save 3 WAYS with...

Essex "Packaged" Wiring Harness

1. ENGINEERING
2. FIRST COST
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Scores of manufacturers have found that they save *time, trouble and money* by turning their electrical wiring harness problems over to Essex specialists.

Essex *One-Source* service handles the intricate job of producing lighting, ignition and control harness assemblies *custom-built* to your exact specifications and *complete* with all manual and electrical control devices for quick, efficient installation.

Through intensive specialization in wiring harness assemblies, Essex has developed line production methods of manufacturing, assembly and inspection, for the economical production of high grade, individually tested, specially engineered assemblies.

Investigate Essex "One-Source" service today!

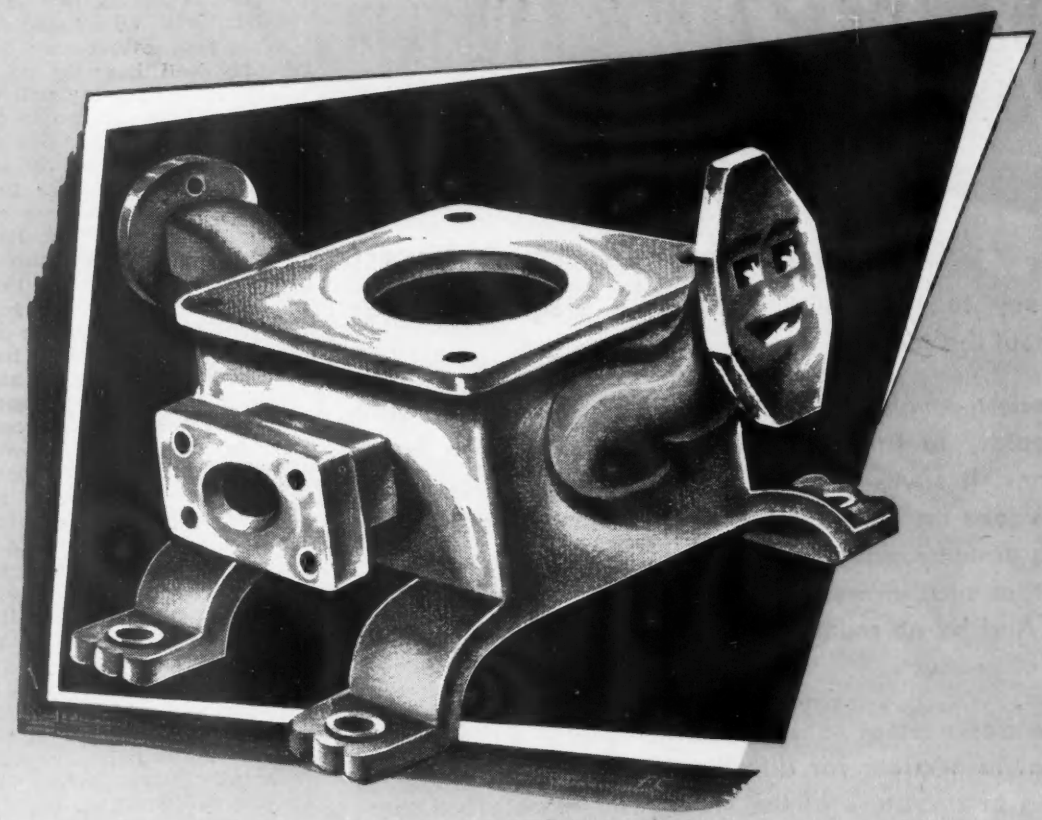
WIRE SX PRODUCTS

ESSEX WIRE CORPORATION

WIRE ASSEMBLY AND CORD SET DIVISION
SALES DEPARTMENT

MONTICELLO, INDIANA

Sales Offices: Chicago, Ill.; Cleveland, Ohio; Dayton, Ohio; Detroit, Mich.; Kansas City, Mo.; Los Angeles, Calif.; Milwaukee, Wis.; Newark, N. J.; Philadelphia, Pa.; San Francisco, Calif.; St. Louis, Mo.



"Cast me a Mumbapani, please!"

No one ever heard C.W.C. say it can't be done. Mumbapanis might be tough to cast, but if someone wanted 'em in volume we would try our darndest. When a manufacturer needs iron or steel castings for his product we want him to come to C.W.C. Here he will obtain the results of years of experience in metallurgical engineering. He will discover the value of precision control in the casting process. He will see the highly mechanized facilities for producing high quality castings with greatest economy. Then he will know that if the part *can* be cast, C.W.C. will do it. Many leaders in industry look to Campbell, Wyant and Cannon for the answers to casting problems. Why don't you?

CAMPBELL, WYANT AND CANNON FOUNDRIES

MUSKEGON, MICHIGAN: *Henry Street Plant* • *Sanford Street Plant* • *Broadway Plant*
SOUTH HAVEN, MICHIGAN: *National Motor Castings Div.* • LANSING, MICHIGAN: *Centrifugal Fusing Co.*

CWC 1908-1948

40 YEARS OF FOUNDRY PROGRESS

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY
MUSKEGON, MICHIGAN

A NEW EQUATION *in* PRODUCTION PROFITS

CONSTANT SURFACE ROUGHNESS

is the key to substantial savings in progressive plants throughout the country.

Modern roughness control enables parts to be brought more rapidly to final size and finish—often with fewer operations. It saves time in setting up for duplication of previous jobs on both long and short runs. It permits impending *dimensional* errors to be detected *before they occur*, so that such errors can be prevented and rejects eliminated. And by no means incidentally, it improves the quality of product.

The closeness of control required cannot be obtained by visual inspection; for differences in reflectivity, lay of the grind or curvature of the work prevent accurate comparison with roughness specimens. Inspection by "feel" is likewise subject to serious human error.

To eliminate errors of judgment—to obtain the dependable accuracy of measurement essential to effective control—more and more companies are using the Profilometer as a regular part of their quality-control equipment.

The Profilometer gives definite, accurate and consistent microinch readings. It is ruggedly built for shop use, and is portable—can be used wherever most convenient. It will measure practically any surface that can be produced by machining, grinding or finishing operations—and it's very simple to operate.

Write for complete information —and arrange for a demonstration in your own plant. You may be surprised to learn the many ways in which this instrument can save you money.

The PROFILOMETER
TRADE NAME REGISTERED

PHYSICISTS RESEARCH COMPANY

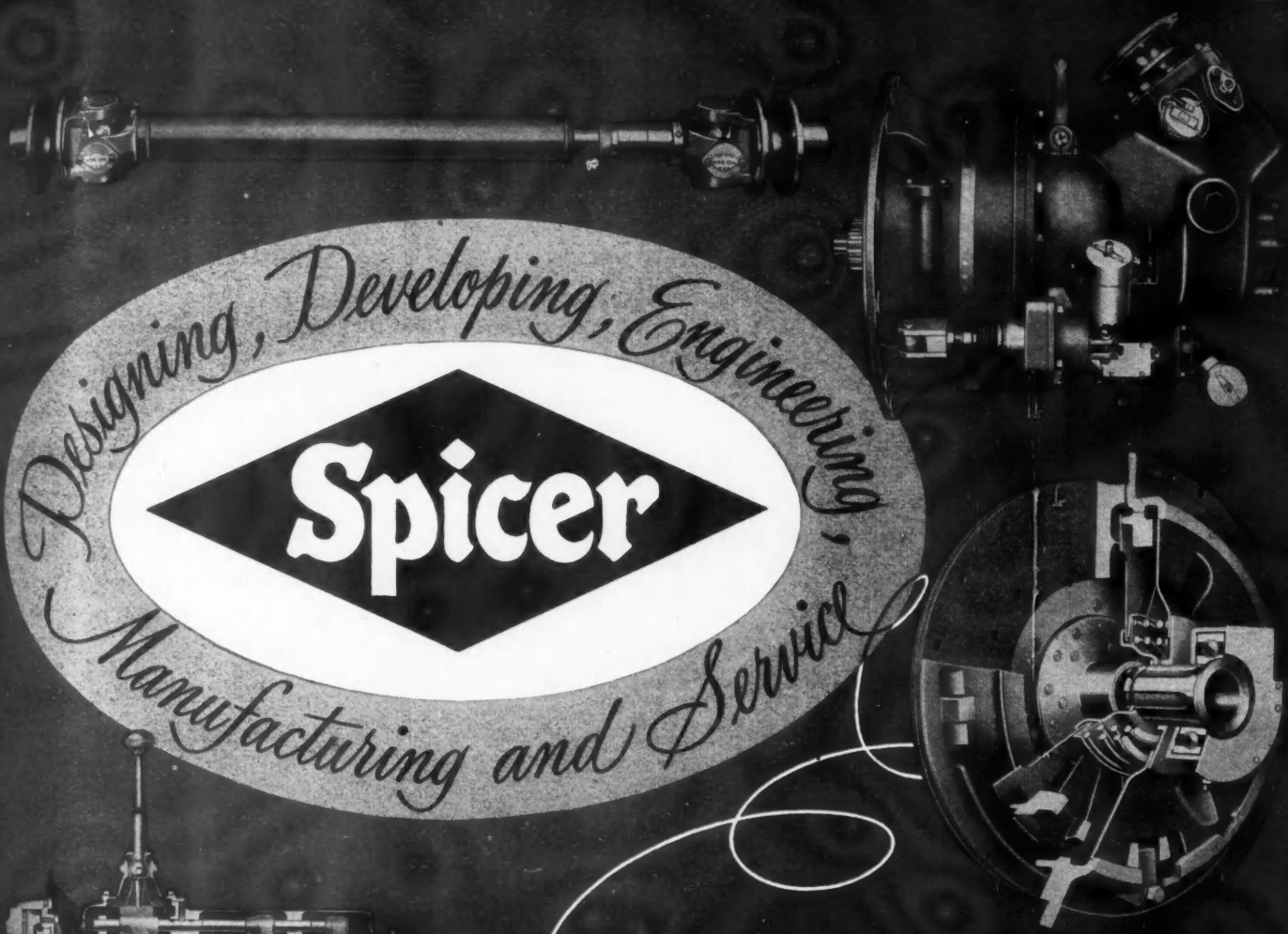
ANN ARBOR • MICHIGAN

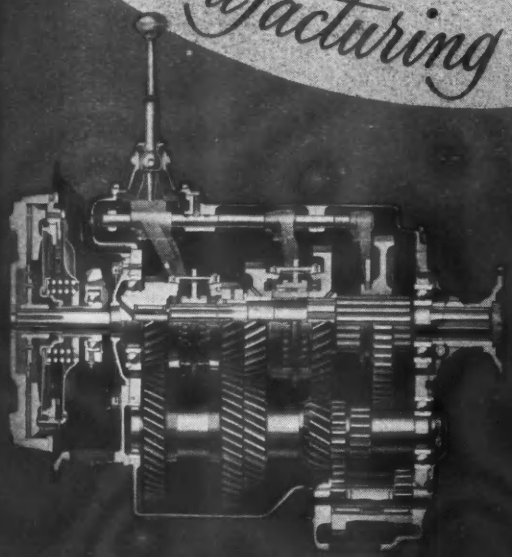
same price to all other csutomers. Actually, the whole question of competitive pricing now is in a state of flux. Both automobile and steel men say that several court decisions probably will have to be made before the steel industry will know exactly how far it can go in meeting competitive prices. Aside from the unfavorable economics of having a single local supplier in the Detroit area, automobile men say that they certainly would not like to be dependent on one source of supply. The general belief is that something will be worked out so that major suppliers still will be able to compete for automobile business when conditions get back to normal, whether it is through modification of the basing point system, construction of new mills, or some other method. Meanwhile, most companies are taking the whole thing rather philosophically. As long as they can get steel to build automobiles, they can get on with the business of producing cars and trucks, and so far it does not appear that the new pricing system is going to hurt the steel supply very much.

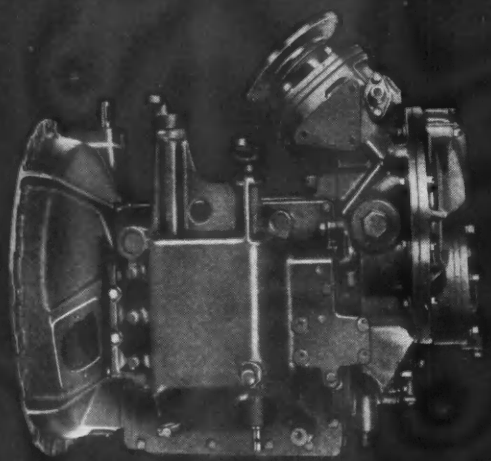
And what of car and truck prices, with steel going up rather sharply in cost to the manufacturer? As one automobile company executive says: "Higher prices for our products follow higher costs of materials as surely as Spring follows Winter."

CALENDAR

Nat'l. Auto. Aces. Assoc., Convention & Show, Chicago	Aug. 9-12
SAE West Coast Mfg., San Francisco	Aug. 18-20
Wisconsin Centennial Automotive Expo. Milwaukee	Aug. 27-29
Amer. Chemical Soc., Washington D. C.	Aug. 30-Sept. 3
Natl. Air Races, Cleveland	Sept. 4-6
SAE Tractor & Diesel Eng. Mfg. Milwaukee	Sept. 7-9
Soc. of British Aircraft Constructors Annual Air Show, Farnsborough	Sept. 7-12
International Foundry Congress, Prague	Sept. 12-19
Instrument Soc. of Amer., Natl. Instrument Conf. & Exhibition, Philadelphia	Sept. 13-17
Industrial Experimentation Training Conf., Columbia University	Sept. 14-18
Turin (Italy) Auto Show	Sept. 15-26
Natl. Assoc. of Foremen Convention & Silver Anniversary, Phila.	Sept. 23-25
3rd Natl. Plastics Expo., New York City	Sept. 27-Oct. 1
Commercial Motor Transport Show, London	Oct. 1-9
New England Materials Handling Exposition, Boston	Oct. 5-7
SAE Aeronautic & Aircraft Eng. Display, Los Angeles	Oct. 6-9
Paris Auto Show	Oct. 7-17
Inst. of Traffic Engineer Annual Mtg. Phila.	Oct. 11-13
SAE Production Mtg., Cleveland	Oct. 21-22
Amer. Welding Soc. Annual Mtg., Phila.	Oct. 25-29
Amer. Soc. for Metals Nat'l. Metal Congress & Expo., Phila.	Oct. 25-29
London Passenger Car Show	Oct. 27-Nov. 6
Society of Motor Mfrs. International Motor Exhibition, London	Oct. 28-Nov. 6
Amer. Soc. Body Engineers, Annual Convention, Detroit	Nov. 3-5
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4-5
Automotive Service Industries Show, Navy Pier, Chicago	Dec. 6-10
SAE Annual Mtg., Detroit	Jan. 10-14
Natl. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24-27







preferred by the Automotive Industry for over 44 years

Spicer has progressed with every technical advancement made by the automotive industry since its infancy.

Spicer has created and produced designs that have revolutionized many phases of power transmission. Typical of these is the Spicer Universal Joint, pioneered for automotive use by Spicer in 1904, and recognized as an absolute necessity to automotive advancement. Spicer has helped make the American automotive vehicle the lowest cost, most efficient in the world.

A large proportion of the manufacturers in the truck, bus and passenger car field uses one or more of these well-known Spicer products: Transmissions, Torque Converters, Passenger Car Axles, Clutches, Stampings, Parish Frames, Universal Joints and "Brown-Lipe" Gear Boxes.

44 YEARS OF Spicer SERVICE

SPICER MANUFACTURING *Division of Dana Corp.*
TOLEDO 1, OHIO

TRANSMISSIONS · TORQUE CONVERTERS · PASSENGER CAR AXLES · CLUTCHES · PARISH FRAMES · STAMPINGS · UNIVERSAL JOINTS · SPICER "BROWN-LIPE" GEAR BOXES · RAILWAY GENERATOR DRIVES

PUBLICATIONS AVAILABLE

(*Continued from page 56*)

scribes extensometers, compressometers and deflectometers that can be used with the recorders. It also shows typical stress-strain curves as produced by recorders, includes common testing accessories and four types of strain gages.

L-36—Electronic Pyrometer Controller

The Bristol Co.—A new bulletin describes the application of the new proportional current-input electronic pyrometer controller, in proportioning the current input to electrically-heated furnaces, ovens, plastic molding machines, etc.

L-37—Socket Screws

The Bristol Co.—A new folder contains interesting information on the application of Multiple-Spline and Hex Socket Set and Cap Screws. It is folder No. DM860.

L-38—Industrial Glass Products

Kopp Glass, Inc.—Glass products for signal, technical and industrial purposes including color filters, industrial lenses, instrument covers, etc., are described in a new 24-page bulletin. Two sections entitled "Glass Engineering" and "Production Quality Control" tell of picture story of the company's manufacturing, designing and testing methods.

L-39—Toolmaker Miscroscope

George Scherr Co.—A new folder fully describes the newly developed Wilder Toolmaker Microscope, pointing out numerous advantages of employing microscopic measuring for checking threads, angles, tapers, bevels and virtually all types of measurements that are common in machine shops and metal working plants. Full specifications and dimensions and a table showing the co-ordinate measurements possible are included.

L-40—Low Resistance Ohmmeter

James G. Biddle Co. A new bulletin on their Ducter Low Resistance Ohmmeter contains photographs, wiring diagrams and charts supporting and illustrating very complete and understandable text on the various aspects of low resistance testing, its application, etc.

L-41—Permanent Magnets

General Electric Co., Chemical Dept.—An 8-page illustrated bulletin describes permanent magnets, permanent magnet assemblies and other metallurgical products. Information on applications, engineering data, materials, etc. is included.

L-42—Clark Electrics

Clark Equipment Co.—The current issue of Material Handling News (company houseorgan) presents a detailed description of its electric battery-powered fork trucks and their uses. Descriptions of important installations of "electrics" and accounts of operations in various fields are included.

ONE SOLVENT...

for all Metals or Combination of Metals

NEW SCIENTIFICALLY IMPROVED BLACOSOLV

FOR SOLVENT VAPOR DEGREASERS

No need to use a special solvent for cleaning a combination of metals—BLACOSOLV degreases them all . . . Safely . . . Quickly . . . Economically.

BLACOSOLV is the most highly stabilized solvent . . . ideal for aluminum, magnesium, brass, copper, steel, etc., either individually or in combination. It is non-inflammable—is positively safe—will not stain or dull even the most highly polished surfaces . . . the one price solvent for all metal degreasing jobs. Its economy is increased in the uninterrupted service it affords you in your production.

Write today for FREE BOOKLET ON Degreasers and application with Blacosolv the all purpose degreasing solvent.

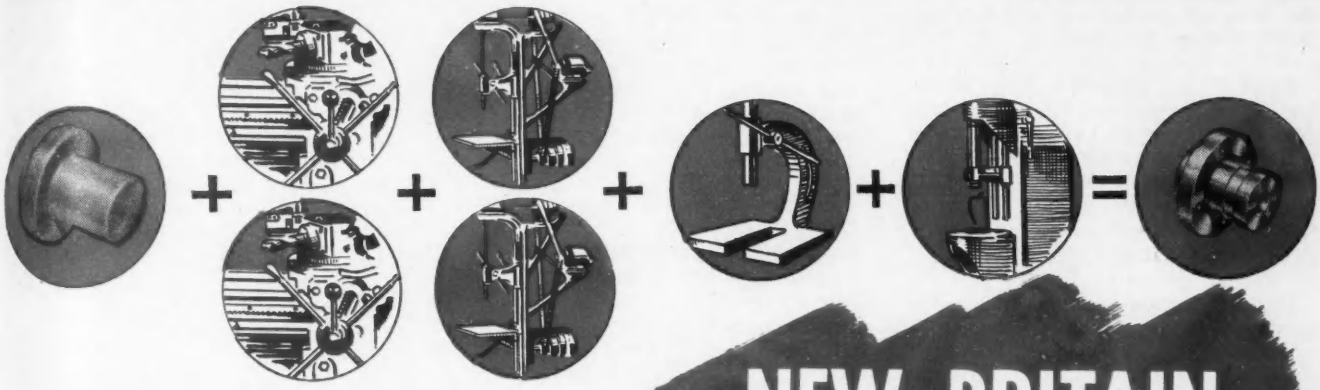
G. S. BLAKESLEE & CO.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

If you are doing this . . .



put the whole job on a.. NEW BRITAIN AUTOMATIC

In many plants, this sort of operation has been going on for years . . . on the theory that the run was too short for an automatic . . . or because "It couldn't be done economically on an automatic."

The squeeze between manufacturing costs and selling prices has prompted many a company to take a considered "second look" at such operations. As a result, a wide variety of pieces are now being completely machined on New Britain automatics, with important economies in manpower, machines, floor space and cost per piece . . . together with improved quality of work.

These features help cut cost per piece on NEW BRITAIN CHUCKERS

- *Double Indexing* of spindle carrier with loading in two positions can be provided to complete both ends of a piece on a single machine.
- *Spindles May Be Stopped* to permit accurate alignment of part for many secondary operations.
- *Open End Construction* reduces setup time and makes tool adjustment easy.
- *Variable Chucking Pressures* in last positions prevent distortion of thin-walled or fragile pieces.

The piece sketched illustrates many typical second operations which New Britains can eliminate. Get the facts and figures on actual jobs. Send for the free folio "Cost Histories". It may suggest a solution to multiple operations which are bottlenecking your production.

THE NEW BRITAIN MACHINE CO.
NB

NEW BRITAIN
Automatics

848 MLI

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Personals

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Ford Motor Co.—**Henry C. Grebe** has been appointed to the newly created position of Director of Body Engineering. **Robert F. Kohr** has been made Director of Engineering Research. **George W. Schultz** becomes Supt. of the Truck and Bus Chassis Div., Highland Park Plant.

Willys-Overland Motors — **Marden R. Bishop** has been appointed Asst. Director of Public Relations. **John S. Conant** has been made General Purchasing Agent.

General Motors Corp.—**E. B. Newill,** General Manager of the Allison Div., has been elected a Vice-President of the Corporation. **David B. Mecorney,** Asst. to the President of the Harrison Radiator Div., has retired after nearly 30 years of service.

Federated Metals Div., American Smelting & Refining Co.—**Fred J. Menninger** has been promoted to the position of Asst. Plant Manager at Newark, N. J.

General Electric Co.—**George P. Lehmann** has been appointed to the personal staff of **Dr. Zay Jeffries,** Vice-President. **Robert L. Gibson** succeeds Mr. Lehmann as Manager of the Company's Plastics Div. **Harold F. Smiddy** has been appointed General Manager of the Chemical Dept.

Perfect Circle Corp.—Announcement has been made of the appointment of **A. J. Weigand** as Fleet Sales Engineer.

Borg-Warner Corp., Norge Div.—**Ira H. Reindal,** executive engineer, has announced his resignation.

Firestone Plastics Co.—**Edgar A. Ryder** has been made Sales Manager of Velon Flex.

Pyrene Mfg. Co.—**George H. Boucher** has been promoted to the position of Vice-President and General Manager.

McCord Corp.—Announcement has been made of the election of **W. G. Hancock** as President of the corporation.

The Sparks-Withington Co.—**E. W. Gentz** is associated with the Sparton Automotive Div., to assist in developing several new Sparton products.

Consolidated Vultee Aircraft Corp. —**Frank A. Learman,** San Diego Div. Manager,has resigned. Other resignations announced are **Harry Woodhead,** former President; **I. M. Laddon,** Executive Vice-President; **David G. Fleet** and **B. W. Sheahan,** Assts. to the Div. Mgr.; **James Kelley,** Wartime Div. Mgr. and **H. S. Martin,** Quality Mgr. **Frank Harrison,** former Vice-President of Curtiss-Wright Corp., has been announced as assistant to **LaMotte T. Cohu,** Pres. Mr. Harrison will be in charge of production at San Diego.

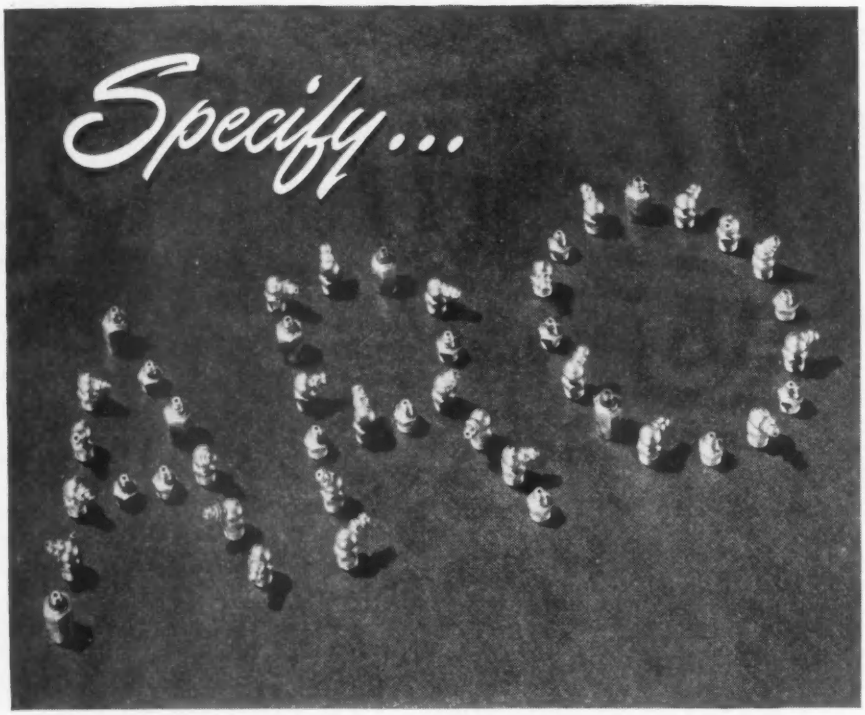
United Aircraft Corp.—**Frederick O. Detweiler,** formerly Divisional Controller of the Sikorsky Div., was named to the post of Asst. General Manager, Chance Vought Aircraft Div.

Gardner Machine Co.—**Alfred J. Bowen** has resigned from the company to devote full time to the development of a new and unusual grinder, called the Bowen Grinder.

Crosley Motors, Inc.—**Jack P. Pedersen,** appointed Commercial Sales Manager.

Hewitt-Robins, Inc. — **George P. Hooper, Sr.,** has been appointed to the newly created position of Manager of Automotive Restfoam Sales.

(Turn to page 68, please)



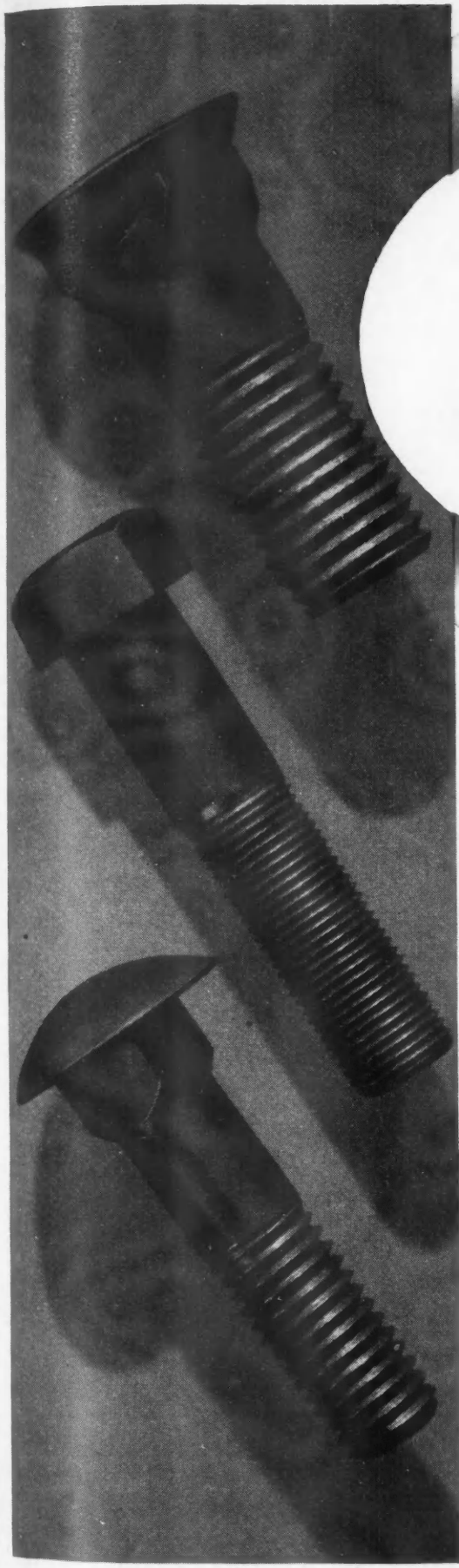
Precision-Made
GREASE FITTINGS
for Original Equipment

Get the *right* grease fittings for every lubrication point—specify ARO! They're accurate . . . rugged . . . dependable!

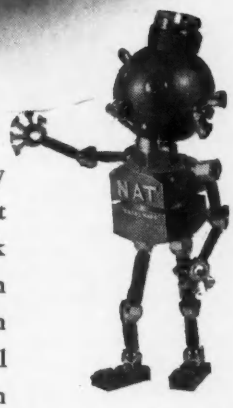
Aro Grease Fittings are new in design. The lower half of head is machined to a perfect spherical shape so that coupler jaws insure a tight, leak-proof seal. Upper half of fitting head is machined concave to permit an easy disconnect of coupler jaws—resulting in *less wear* on jaws and fittings. Made of specially hardened steel with machine-cut threads for accuracy. Complete range of types and sizes. Write for details. The Aro Equipment Corporation, Bryan, Ohio.

ARO

LUBE EQUIPMENT AND AIR TOOLS
FOR AUTOMOTIVE SERVICE...
INDUSTRY... FARM



Tough Bolts for Rugged Work



These big, rugged bolts for heavy tractors, earth-moving equipment and heavy machinery are the "work horses" that handle unusually tough fastening jobs. Made from high carbon or alloy steel, with special heat-treatment, these bolts, when tightened, have extremely high resistance to stress, shear, fatigue and impact to prevent wear or breakage. They are made to perform hard tasks.

For special fastening jobs, "National" has designed and produced many special headed and threaded fasteners by the upset, cold headed process that have proved stronger and lowered costs. With its wide variety of manufacturing equipment used to make the most complete line of bolts, nuts, screws and other fasteners, "National" has the facilities to supply you with the right fasteners (large and small, standard or special) to make the products you manufacture fit better—stay tighter—or operate more smoothly.

National PRODUCTS

THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

Serving Our Biggest STEEL MILLS

• • • WOVEN into the fabric of America's great steel industry are many fine Layne Well Water Systems. They are more than qualified in capacity and quality to produce all the water needed for Steel Mill use; cooling, cleansing, waste dispersal, drinking, bathing, fire, etc. Their rugged construction gives years of low upkeep service.

But as with Steel Mills, Layne Well Water Systems are also serving other great industries; chemical plants, oil refineries, paper mills, packing houses, factories and big and little cities by the hundreds.

It is a well known fact that Layne Well Water Systems are built to the very highest standards. They are installed exclusively by the Layne Organization Affiliated Companies —and according to Layne's exacting specifications.

Layne also provides valuable engineering counsel on water and pump needs for all commercial, industrial and municipal needs. There is no obligation for this service.

For Catalogs, Bulletins or information on any phase of Well Water development, address

LAYNE & BOWLER, INC.
General Offices
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LAYNE WELL WATER Systems

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Western Co. of Minn., Minneapolis, Minn. ★ International Water Supply Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F.

Personals

(*Continued from page* 66)

De Laval Steam Turbine Co.—**H. L. Watson** has announced his retirement as President. The election of **George W. Smith, Jr.,** as his successor was also announced.

The Harrington & King Perforating Co.—**David K. Colesberry** has been made General Sales Manager.

Monsanto Chemical Co.—The election of **Arnold H. Smith** as President of Monsanto (Canada), Limited, with offices in Montreal, was announced by **William M. Rand,** President of Monsanto Chemical Co.

Electro Refractories & Alloys Corp. —**Robert A. Webber** was recently appointed Manager of the new Subsidiary, Electro Refractories & Alloys (Canada), Ltd.

The General Detroit Corp.—**Robert L. Weir** will succeed **Harris Popplewell** as head of the corporation's Canadian subsidiary, The General Detroit Corp., Canada, Ltd.

Charles Rein & Co., Inc.—**Louis F. Mastriani** has been made Sales Manager.

Airquipment Co.—**Carter E. Circle** has been made Sales Manager.

United States Rubber Co., Tires Div.—**Dwight B. Eldred** has been made Asst. Sales Mgr.

Gyrodene Helicopter Averages 124 Mph

Flying a Gyrodene manufactured by the Fairey Aviation Co., Squadron Leader Basil Arkell has attained a speed of 124.3 mph as an average over four runs of three kilometers. This will be submitted to the international association as a world's record. The previous record was held by a German machine with 122.533 mph.

The Fairey Gyrodene is a four-seater helicopter which, in place of the usual tail rotor has a conventional airscrew located on the starboard wing tip. It is powered by a nine-cylinder Alvis "Leonides" giving 500 bhp for take off. Range of action is 230 miles, cruising speed 100 miles and maximum speed 125 mph. The absolute ceiling is 18,000 feet. Diameter of the rotor is 52 feet. Weight empty is 3270 lb and useful load 1230 lb.

Print
• SHORT LENGTH TUBING
• WELDING RODS
• SOLDER BARS
Quickly Economically

with this Pannier "MASTER MARKER"

ANOTHER Pannier FIRST

You get fast, efficient printing of ⅛" to 2" diameter, ferrous and non-ferrous products with the Pannier Universal Marking Machine, No. C-1055-A. This "Master Marker" handles uniform and irregular lengths up to 24". It prints continuously or intermittently at 72 feet per minute. It prints in perfect register, thus correctly marks bar recesses.

Powered by a ¼ H.P. motor, the machine is equipped with a quick-change printing wheel; belt conveyor; and automatic, interior-feed ink fountain for maximum service at minimum cost.

Pannier is a specialist in design, engineering and manufacture of all types of marking equipment. Write for recommendations.

SEND FOR FULL DATA
Bulletin C-1055-A, giving detailed specifications, is yours on request.

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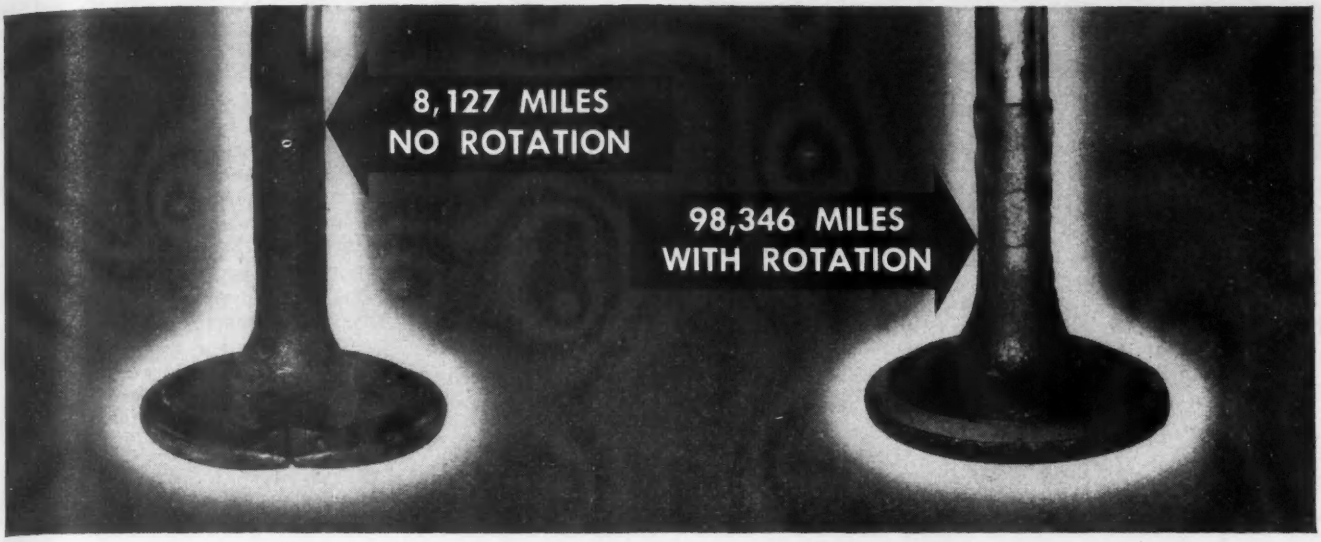
MASTER PANNIER MARKERS
THE PANNIER CORPORATION
401 Pannier Building
Pittsburgh 12, Pa.

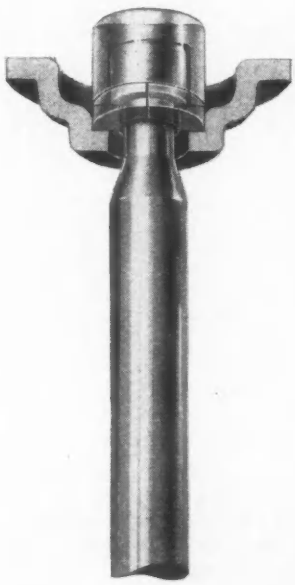


.7 MILLION MILES

prove

EATON VALVE ROTATORS

eliminate valve failures between major overhauls



Eaton Valve Rotators have completed more than 7 million miles, over a period of 4 years, in trucks and buses. The operations include various types of service and more than 100 vehicles of several different makes.

RESULTS:

VALVE LIFE..... Increased to equal mileage between major overhauls.

PERFORMANCE... Fuel and power output maintained at new-engine level to major overhaul.

A complete report has been published in the latest issue of the Eaton Engineering Forum. Copies will be mailed upon request.

The operating principle of the release-type rotator involves simply a momentary release of spring load, permitting the valve to turn in accordance with its natural tendency. Eaton Valve Rotators are adaptable to all types of internal combustion engines and require no change in basic engine design. Eaton engineers will welcome an opportunity to discuss this device with engine and vehicle manufacturers.

EATON
MANUFACTURING COMPANY
CLEVELAND, OHIO

VALVE DIVISION • 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

STANDARDIZATION OF AIRCRAFT MATERIALS EASES SUPPLY PROBLEMS

Because of a unique display of cooperation between customers and vendors, West Coast aircraft factories have improved the supply of raw materials obtained through warehouses. This improvement in the basic system of raw materials supply is particularly significant in light of the anticipated acceleration of production expected for West Coast factories in the months to come.

The improved supply has resulted from a project of the National Aircraft Standards Committee to compile a standard Warehouse Stock List for West Coast manufacturers and suppliers. The NASC, a unit of the Aircraft Industries Associated, adopted the project in 1946 as the result of suggestions by Northrop Aircraft, Inc., that preparation and use of a standard stock list would permit aircraft companies to make deviations—or substitutions of material specifications—before the production drawings were released—not afterwards, when schedules are short. Northrop was appointed to conduct the project through its standards department, and the project was designated No. P354-NO.

In a nutshell, the aircraft companies agreed to eliminate many differences in choice of specifications, tempers, finishes and sizes and to specify materials from the Warehouse Stock List; the warehouses agreed to keep a constant supply of these materials on hand. Glen M. Aron, head of Northrop's standards department, was made chairman of the Warehouse Stock List committee. With his committeemen, he enrolled West Coast manufacturers and warehouses in a move "to eliminate all possible buying differences and to maintain the preferred items in local stock."

Aircraft companies obtain raw materials from warehouses, rather than mills, because of limited contracts and the length of time required for mill shipments. Warehouses have always found maintenance of adequate stocks most difficult because of the differences in buying practices of the different aircraft companies. For instance, as many as eight different types of the same diameter and wall thicknes steel tube might be required because of variations in alloy, heat treat and finish. In the Warehouse Stock List, these variations already have been reduced to as few as two and, in some instances, to one.

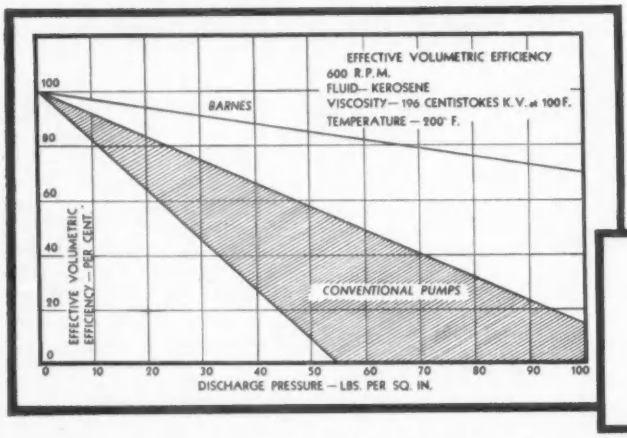
Preparation of the stock list has been a major task, but it already has shown results. As an example of the work required to prepare the list, steel tubing suppliers voluntarily made complete inventories of their stocks and sales. These inventories were used by the stock list committee in its final discussions on tubing standards.

The sub-committee has listed the four major aircraft raw materials—alloy steel, stainless steel, aluminum and magnesium. Each list covers sheet, strip, plate, bar and tube stock. Duplications and near equivalents were eliminated by voluntary action of the two groups—buyers and sellers. The stock list committee expects to prepare copper and brass lists next.

With the "standard lists" prepared after months of voluntary effort, supply houses agreed to keep reasonable amounts of these preferred items on hand, aircraft engineering departments were asked to specify standard stocks wherever possible, and aircraft material departments began using the list in preparing material manuals and establishing their individual factory stock lists.

John S. BARNES

Constant-flo ROTARY GEAR PUMPS



The BARNES Constant-flo Pump shown below is Model PA-7100-A designed for a variety of automotive applications and available in sizes from 20 to 360 gph.

Efficiency Chart Proves SUPERIOR PERFORMANCE. LONG LIFE and HIGH QUALITY are added Features.

The simplified diagram shown above is the summary of a series of careful comparative tests. Note that it is taken on a low-viscosity fluid at a fairly high temperature and at a relatively low speed. Note also that the majority of conventional pumps tested failed completely in delivery above 60 psi while the BARNES Constant-flo Pump was showing better than 80% effective volumetric efficiency at this point and only dropped off to around 70% at 100 psi.

This illustrates effectively that the BARNES is a "tight" pump — in other words, slippage has been reduced to a minimum by achievement of almost a perfect seal in the gear design. The BARNES gear-tooth structure is an exclusive, patented form which not only minimizes slippage but also reduces aeration and foaming by elimination of a common vacuum condition. This all adds up to — *superior performance.*

BARNES Constant-flo Pumps are manufactured of high grade materials, machined to exceptionally close tolerances on a specially-tooled, modern production line. This insures a uniform extra-quality product which can be furnished at competitive prices.

BARNES Constant-flo Pumps serve many purposes. Write today for descriptive literature and engineering data sheets suggesting numerous applications.

JOHN S. BARNES CORPORATION
301 S. Water St., Rockford, Illinois

Compact, Efficient, HIGH QUALITY, Long-Life Oil Pumps

1ST STANDARD EQUIPMENT CHOICE

OF LEADING CAR, TRUCK AND TRACTOR MANUFACTURERS!

Test it! Compare it! That's all we ask. That's all you'll need to do to know why the Aetna T Type Clutch Release Bearing has been breaking performance and volume records throughout its 18 year history—why it enjoys the pronounced and uninterrupted preference of more than 50% of motordom's clutch release bearing users. May we send a sample for test?

AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue Chicago 39, Illinois
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AETNA BALL & RO
NOS. 1,958,725 & 2,140,818
Oil-filled bronze retainer locks raceways in permanently true alignment, ends the noise, wear and fear of eccentric thrust.
Large capacity lubricant chamber counteracts centrifugal force, returns lubricant to balls, prevents lubricant's escape to clutch facings.

Exclusive features protected by U.S. patents Nos. 1958725 and 2140818

Aetna T-TYPE Clutch Release BEARINGS

WITH THE... ...THAT TAMES TROUBLE

Supply companies have been able to reduce the quantities and varieties of raw material items they must stock by 50 per cent, while not materially reducing the value or weight of stock they kept on hand. The inventory of steel tubing suppliers revealed they carried a total of 2200 different items on their shelves. Some of these items had been stocked for several years without a single sale. Now, with the NASC Warehouse Stock List they are able to carry as few as 217 steel tubing items and still meet requirements of the industry.

FIRST BUSINESS CENSUS UNDER NEW LAW TO BEGIN NEXT YEAR

By George H. Baker,
Washington Bureau,
Automotive Industries

The United States Bureau of the Census—the nation's official gatherer of facts and figures—is getting ready to take the first censuses of business and industry since 1939. The Census Bureau, realizing that many business men chart their courses well into the future after studying the official government reports, has been increasingly self-conscious about its out-of-date figures since the end of the war.

Tremendous changes have been made in the production and distribution systems of many industries since 1945. Populations have shifted from certain areas of the country to others. Business as a whole has expanded — both in existing and in brand new fields.

Business organizations all over the country—from the U. S. Chamber of Commerce to the smallest trade associations—have been after Congress to do something about this lag in commercial statistics. This year the lawmakers did something—at the urging of Representative Harold C. Hagen, R., of Minnesota. And President Truman lost no time in signing Hagen's bill into law. Mr. Hagen says the new law will satisfy an urgent need for up-to-date information concerning distribution, mineral industries, service trades, and other businesses.

He further points out that the types of businesses affected include growers, packers, refiners, manufacturers, distributors (including wholesalers, brokers, jobbers, retailers and service establishments), firms dealing with marketing problems (such as market research agencies, advertising agencies, newspapers, magazines, trade journals, and broadcasting stations), transportation agencies, government agencies, trade associations, chambers of commerce, universities, schools, libraries, and other groups.

The new law provides for the first such census (except that of manufactures) to be made in 1949 and in all subsequent years ending in 4 or 9. Since provision for a census of manufactures is made in appropriation bill, the first census of this type will not be made until 1954.

In the field of transportation, the statute provides for the collection and publication of statistics from air, rail and truck operators, but duplication of information collected by such agencies as the Interstate Commerce Commission is prohibited. Particular emphasis is placed on collection of trucking data, since the rapid growth of this form of transportation has left existing statistics sadly out of date.

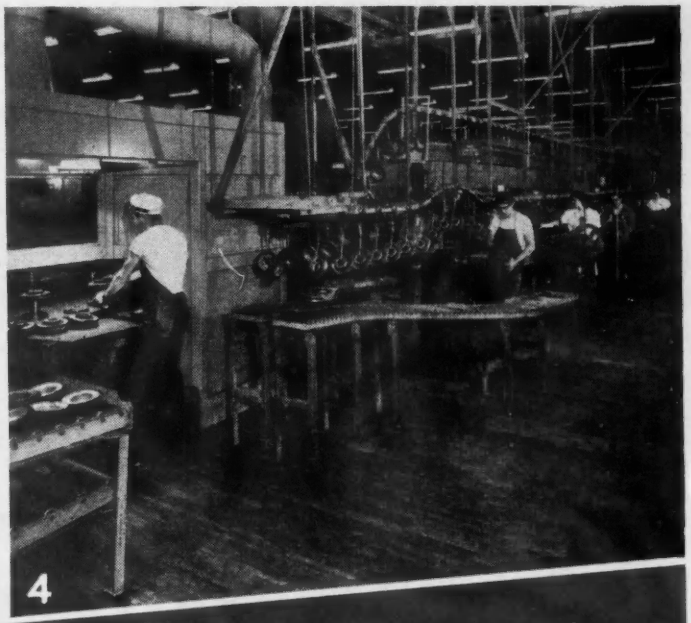
(*Turn to page 76 please*)

Better Bumpers by *Bath*

BATH Contour Forming
makes them in one piece . . .
stronger, more economically

Tooling costs are much lower because only **one die** is required for BATH Contour Forming. No stock is wasted in forming.
BATH one-piece bumpers are much stronger than those made in two or three sections.
Use of stainless clad permits a wider variation in cross section design.
Stainless clad is more resistant to corrosion —lasts much longer than plated steel.
No limit to length, width or thickness.
Can be polished to No. 7 gloss, comparable to highly polished, plated finish.
BATH bumpers also available in mild or high tensile steel for other finishes.
Write, wire or phone for further details.

The CYRIL BATH Company
6915 Machinery Avenue Cleveland 8, Ohio



in this Brand New Plant!

Newest addition to the United States Rubber Company's family of modern plants is now operating in Fort Wayne, Indiana. In its spic-and-span, streamlined, air-conditioned interior, rubber-bonded-to-metal and other parts are being made . . . parts that help to reduce vibration, noise, shock and wear in America's finest cars and trucks.

Many years ago U. S. Rubber engineers joined with Automotive Engineers in pioneering the technique of bonding rubber to metal. Since then, this technique has been extended and refined immeasurably.

This new factory at Fort Wayne is proof of our continuing efforts to be first always with the best for the Automotive Industry.

Engineered Rubber Products for the Automotive Industry

1. The "Brass-o-matic" Process, U. S. Rubber's exclusive method of brass-plating metals.

2. Conveyorized system for spraying adhesive on brass-plated metals for rubber-to-metal bonding.

3. One of the batteries of efficient versatile hydraulic presses that mold the all-rubber or rubber-to-metal parts.

4. Automatic buffing and precision testing of vibration dampeners.

5. Molded goods finishing department —fully conveyorized and equipped with the most modern machines.

MADE BY

U.S.RUBBER

SERVING THROUGH SCIENCE

FORT WAYNE
INDIANA

NEWCOMB-DETROIT

WATER TUBE SPRAY BOOTH WITH *Built-in Fan*

PRE-ASSEMBLED FACTORY-TESTED UNITS

Newcomb-Detroit brings to the finishing industry another important first*—the pre-assembled Water-Tube Spray Booth with built-in fan. Newcomb-Detroit Water-Tube Spray Booths are 90% assembled at the factory and are given trial runs before shipment . . . only the stack and spray area enclosure are shipped "knocked-down." This eliminates 80% to 90% of the assembly time normally required at the point of use and also assures maximum efficiency at first operation.

Water-Tube Spray Booths contain a series of tubes through which the paint-laden air passes after going through the water curtain. Each tube contains two clog-proof nozzles which spray a large volume of water against the flow of air. Air then passes through moisture separators and enters the built-in exhaust fan . . . clean—free of paint and moisture. The efficiency of these pre-assembled units has been proven in the plants of leading manufacturers throughout the U. S.

Send for descriptive catalog which gives complete details on construction and operation.

**In 1924, basic patent No. 2,097,253 was issued to Newcomb-Detroit Company on the first water curtain spray booth.*

ENGINEERED FINISHING SYSTEMS

Newcomb-Detroit is one of the pioneers in the field of engineered finishing systems for all types of industry. These systems include equipment for metal cleaning, painting, drying, dust collection, air processing and whatever other operations are needed to turn out flawless, economical finishes on any product. Have our engineers consult with you on your own product finishing.

Established 1912

NEWCOMB-DETROIT COMPANY

Grand Rapids Division—Plant
GRAND RAPIDS, MICH.

Main Office and Plant
5741 Russell Street
DETROIT 11, MICHIGAN

Western Sales Office
CHICAGO, Ill.

Trucking, stated Representative Rees, R., of Kansas, is of "growing importance, not only in the location of industries, and the transportation of goods, but also in developing and planning the highway transportation system of the country." He added that trucking "has significant application with respect to problems which would arise in attempting to meet a future national emergency."

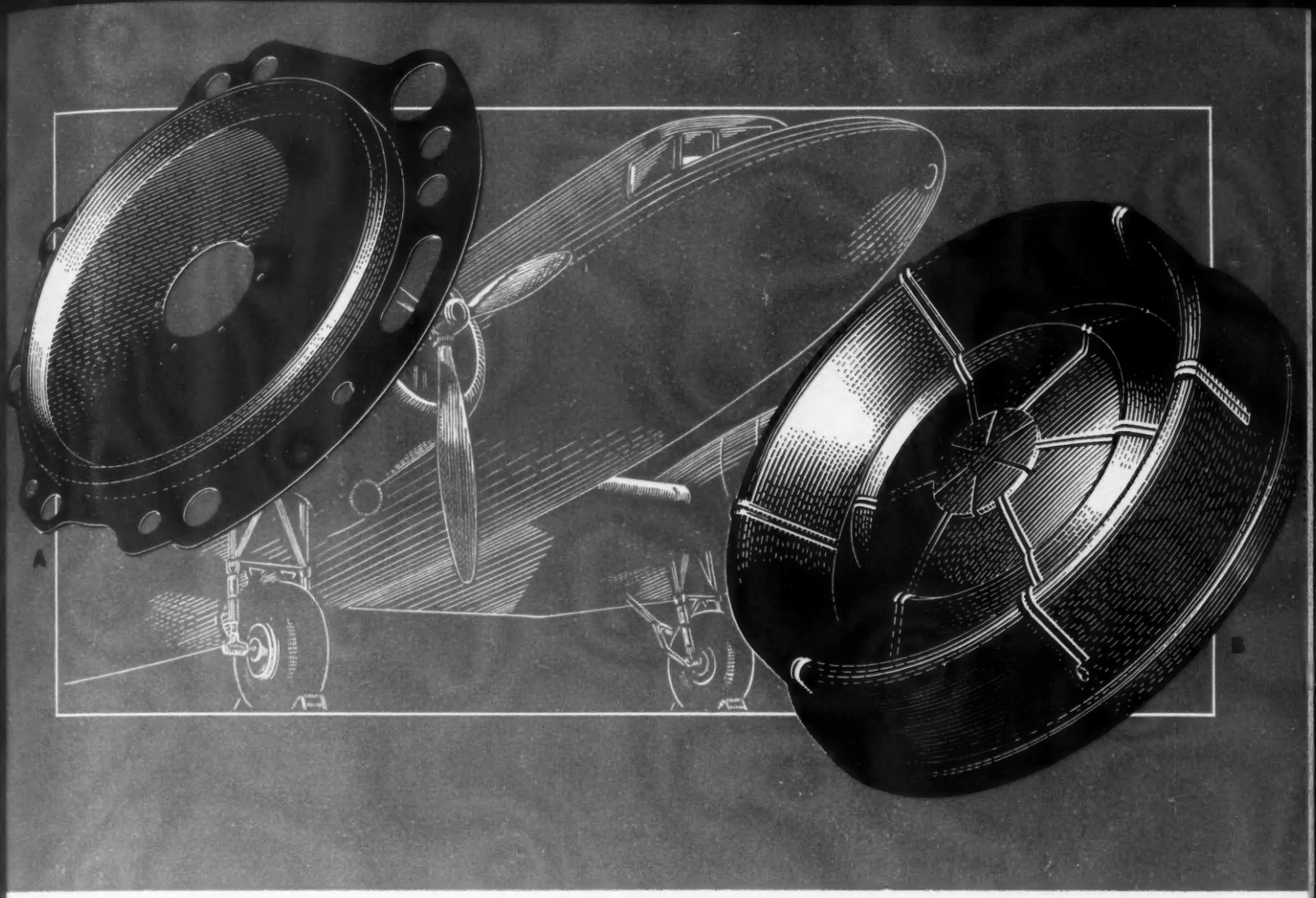
Although the Census Bureau estimates that it will need about $14,000,000 to tackle the new project, it believes that over a 10-year period there will be no increased cost, because of the reduced number of times the census of manufactures will be taken. These latter censuses previously were taken every two years.

Representative Michener, R., of Michigan, warned the Census Bureau, however, to avoid red tape, unnecessary questions and burdensome forms in its collection of business statistics. "I hope that in taking the census some practical businessman will have something to say about the questions, the answers, and the form in which this census is taken," he declared. "This census is for the benefit of and the help of our businessmen and industry, and if we can have more efficiency, less red tape, forms, and needless questions, maybe some good will come out of this census."

Under previous laws, the business and population censuses were all taken during the years ending in zero. This threw a top-heavy burden on the Census Bureau during those years. Now, the population census will continue to be taken during the years ending in zero, while the business censuses will be taken during the years ending in 9 and 4. This is calculated to reduce peak loads in the Census Bureau and spread the work load more evenly.

"As a result of the greater frequency of the census of business and the new census of transportation provided in the bill, businessmen will have information which will enable them further to expand American enterprise," Representative Allen, R., of Illinois, told the House during debate on the measure.

Readers of
Automotive Industries
are Always
Well Informed



HOW SIRVENE SERVES IN THE *Aviation Industry*

"A" is a special diaphragm engineered for an aircraft injection carburetor. "B" is an accumulator diaphragm which maintains the separation of air and hydraulic fluid under pressure.

Both of them function at critical points in aircraft engines, where meticulous care for design properties and material characteristics is essential. Original designs were developed and revised to the point of absolute dependability; special Sirvene formulae were created for the compounding of pure, oil-resisting elastomers; and, finally, the parts were produced under strict laboratory control to deliver the exact degree of elasticity, tensile strength and resistance to temperature extremes, fluids, age and wear required by specific-operating conditions.

These diaphragms typify Sirvene's service to aviation—and the way all Sirvene parts are developed and produced. Each is unique in purpose, design and structure.

Sirvene parts assure continuous dependable service under conditions where other materials fail. For your pliable parts problems, investigate Sirvene first.

CHICAGO RAWHIDE MANUFACTURING CO.

1310 Elston Avenue SIRVENE DIVISION Chicago 22, Illinois

Sirvene products include diaphragms, boots, gaskets, oil seals, washers, packings, and other special molded mechanical pliables

OTHER C/R PRODUCTS
PERFECT Oil Seals
SIRVIS Mechanical Leather

ENGINEERS: For basic information, write for your copy of "Engineering with Sirvene." There is no charge.

SIRVENE

THE *SCIENTIFIC* COMPOUNDED ELASTOMER

New York • Philadelphia • Detroit • San Francisco • Cleveland • Boston
Pittsburgh • Los Angeles • Cincinnati • Minneapolis • Syracuse • Peoria

Majority of Australian Automobiles Over Eight Years Old

A report from Australia states that a recent survey made by the Dunlop Co. shows there are just over a million motor vehicles registered in that country. Of the 606,398 passenger cars registered last December, no less than 514,977 were over eight years old; 403,781 were over 10 years old; 212,918 were over 15 years old, and 97,014 were 20 years old and upward.

Reportedly, the survey points out that it will take at least 11 years to replace all of the automobiles on the road. This is based upon the assumption that there will be a sale of 50,000 new cars in 1948, and 60,000 per year thereafter.

The status of commercial vehicles is said to be worse, units over eight years old numbering 279,032 or 78.95 per cent of the total registered at the end of 1947. It is estimated that it will take at least 13 years before the number of commercial vehicles can be brought to a condition of efficiency and economy.

However, continues the report, this does not take into account alterations in the matter of imports which may come about as a result of a change of government; present indications point to a defeat of the labor government at the next elections, and with a government of men anxious to encourage overseas trade, a much different complexion may be put upon the matter.

At the present time no motor vehicle can be secured in Australia without a permit, but according to the report, stocks of eight and 10 hp vehicles are improving at such a rate that it is expected that these will be available, before long, without permits. But British light cars are still somewhat high in price, a 10 hp model costing between $3360 and $3840 at par, while several eight hp models are priced at $2880.

Distributors, however, are now said to be faced with the possibility that their margins may be cut, as the Prices Commissioner is examining such margins with a view to bringing automobile prices down to a lower level.

General Motors Holdens Ltd., is reported as revealing that mass production of its new all-Australian car is expected during the last quarter of this year. No details of price, horsepower, transmission, engine design or braking system can be secured, but it is rumored that the vehicle will sell at around $2400.

RIBBED AND PLAIN . . .

LARGE AND SMALL . . .

GUNITE PROCESSED IRON has proved to be an ideal material from which to cast Brake Drums for a wide variety of services. It is a fine-grain, high-strength iron, with uniformly distributed graphite particles, easily machinable, and uniformly controlled as to grade. The picture above shows four notable application examples — a large ribbed drum for heavy-duty highway truck service, a larger and narrower plain drum used on big logging trucks, and, in contrast, the drum for a popular make of motorcycle, and the drum (with integral hub) used on a familiar small-size high-performance passenger automobile. This picture shows the rough castings after cleaning, ready for machining either by us or in the customer's plant. GUNITE BRAKE DRUMS have shown their superiority by a hundred million miles of silent proof in tough over-the-road service. *Buy GUNITES — for better braking!*

MADE BY
GUNITE FOUNDRIES
ROCKFORD, ILLINOIS

GUNITE CAST WHEEL ASSEMBLIES FOR TRAILERS AND TRUCKS INCLUDE FAMOUS GUNITE BRAKE DRUMS

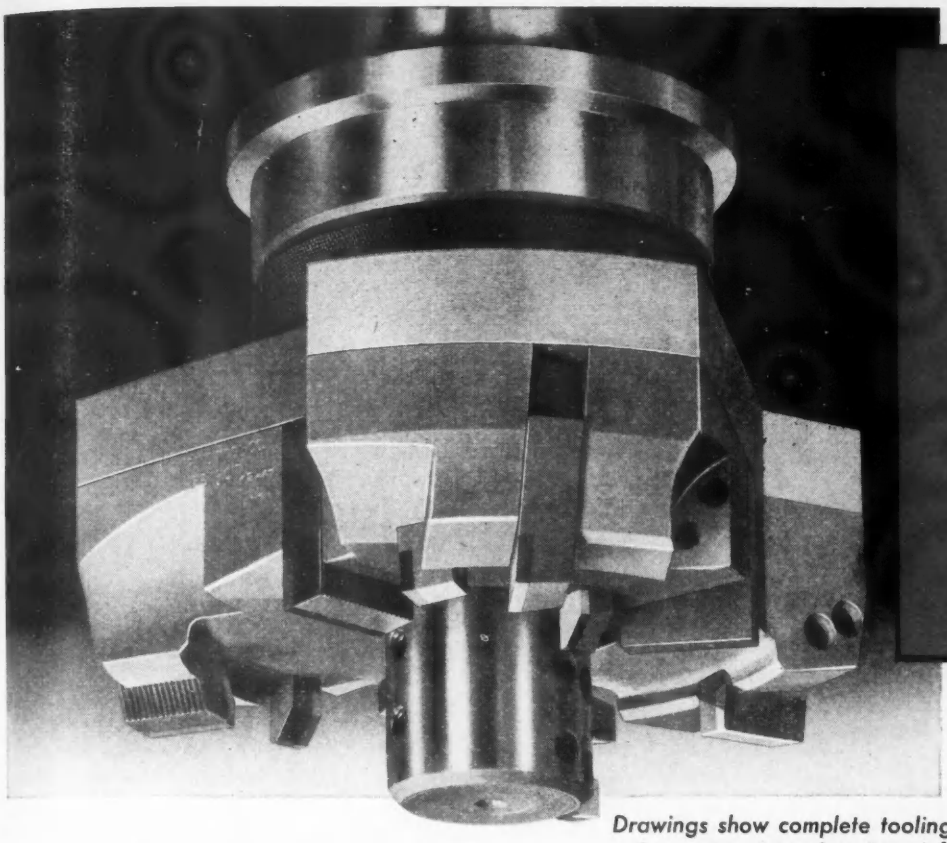
Dow Develops Process for Electroplating Magnesium

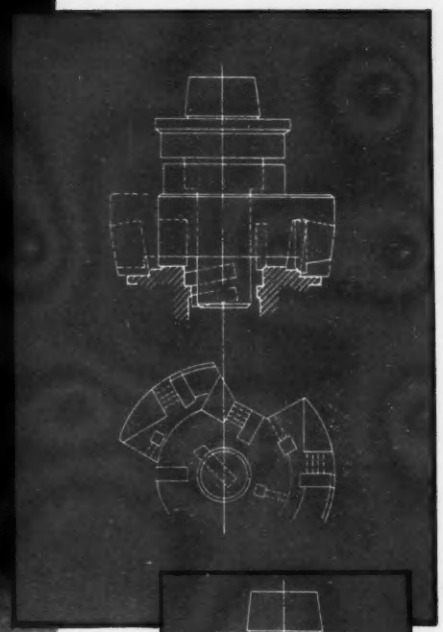
A successful new process for depositing a thin film of zinc on magnesium permits for the first time the electroplating of magnesium by essentially standard techniques and with excellent results, according to a recent announcement by The Dow Chemical Co.

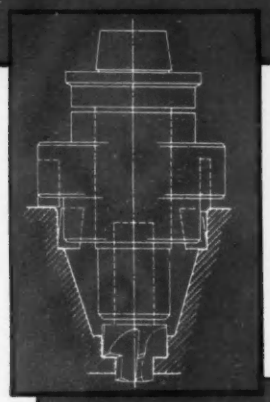
This plating procedure differs from that of commercial processes on other metals only in the method of preparation for the final deposit. The initial stages in plating magnesium are specifically to remove contamination and to provide the correct type of reactive surface that will promote good adhesion and a continuous deposit. Wrought articles that are to be polished or buffed should first be pickled in 20 per cent acetic acid plus five per cent sodium nitrate. Segregates of intermetallic compounds, normally found on surfaces of cast products, should be removed by pickling in a 75-80 per cent phosphoric acid solution prior to polishing or buffing.

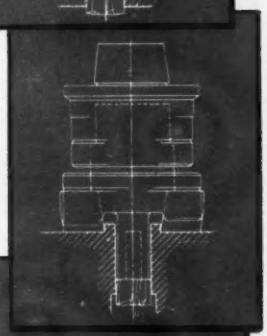
Magnesium is degreased by conventional vapor or immersion methods and then cathodically cleaned in alkaline cleaners such as are used on steel. To activate the surface, pure

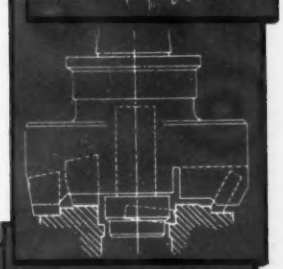
(Turn to page 80, please)











Multiple Tooling

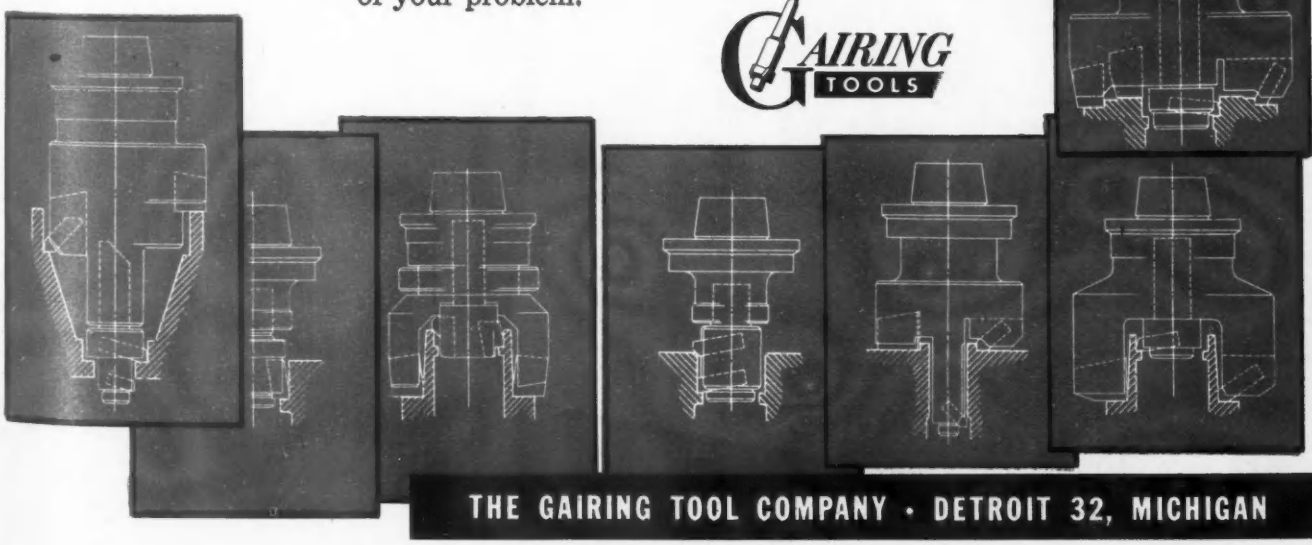
Drawings show complete tooling for a two-way, trunnion-type, four-spindle, roughing and precision boring machine, producing power take-off units. Each tool performs one or more operations such as boring, counterboring, chamfering, facing, and hollow milling.

More precision parts at lower costs are made possible through specially designed inserted blade cutting tools.

This actual example of multiple tooling recently completed by GAIRING suggests how the use of sound and proven principles of cutting tool design might improve the production of *your* machines.

So, if your present production falls short of expectations, let GAIRING'S engineers make a comprehensive analysis of your problem.

GAIRING TOOLS



THE GAIRING TOOL COMPANY · DETROIT 32, MICHIGAN

magnesium or M alloy is then given a 15-second to one minute mild pickle in a one per cent acetic acid solution. Because of a smut which forms on the aluminum or zinc-containing magnesium alloys immersed in acetic acid solutions, these are pickled for the same length of time in 20 per cent $AlCl_3.6H_2O$.

Wholesale Prices Have Doubled Since 1938-39

Up to the recent further advance of consumer prices in the American economy, prices in wholesale markets had doubled and living costs had risen two-thirds since 1938-39 in the same accelerating price advance that has characterized previous wartime expansions. This is shown in a study of postwar prices published by the National Bureau of Economic Research.

Of the elements of the price structure, ranked in order of the relative size of their price movements, farm prices are at the top with a rise of almost 200 per cent. Rents are at the bottom, with an increase of only 11 per cent. The prices of equity shares in industrial corporations, which advanced only 26 per cent, are near the bottom. The general cost of living for urban workers, which was held down by the stability of rents, rose 68 per cent. Seven of eleven major classes of commodities and services are in a central group, the price increases of which ranged from 90 to 126 per cent. This group includes relatively smaller ones. Foods at the producer goods stage advanced 196 per cent, goods for use in capital equipment rose 59 per cent.

The flow of goods into actual consumption appears to have been 40 to 50 per cent greater in 1947-48 than in 1939. Practically all types of goods and services commonly bought by families shared in the general elevation of living standards; expenditures for food, clothing and durable consumer goods rose most.

In the most recent months studied, volume increases had been checked in some lines and in the broad field of consumer goods they were tapering off. Increases in expenditures reflected, mainly, rising selling prices. This is a situation that had its close counterpart in the 1919-21 cycle it is pointed out.

The gains in industrial output between 1939 and 1948 have been one of the major defenses against unbridled inflation. These amounted to 82 per cent in manufacturing production. Corresponding gains of 70 per cent were scored in manufacturing employment, 118 per cent in volume of freight carried by railroads, and about 27 per cent in agricultural output.

With increases of considerable size in both prices and production, the economic expansion here between 1939 and 1948 has no exact historical parallel. During the first world war, prices advanced similarly but output gains were less notable. During the 'Twenties there were output gains on the same order, but the general level of commodity prices suffered merely minor shifts.

WITH THE ACCENT ON RIDING COMFORT,
MANY OF THE NEW CARS
AND COMMERCIAL VEHICLES
COME FACTORY-EQUIPPED WITH GABRIELS
MORE THAN EVER BEFORE, CAR AND COMMERCIAL VEHICLE MANUFACTURERS ARE SWITCHING TO
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The Best Known Name in ride control devices!
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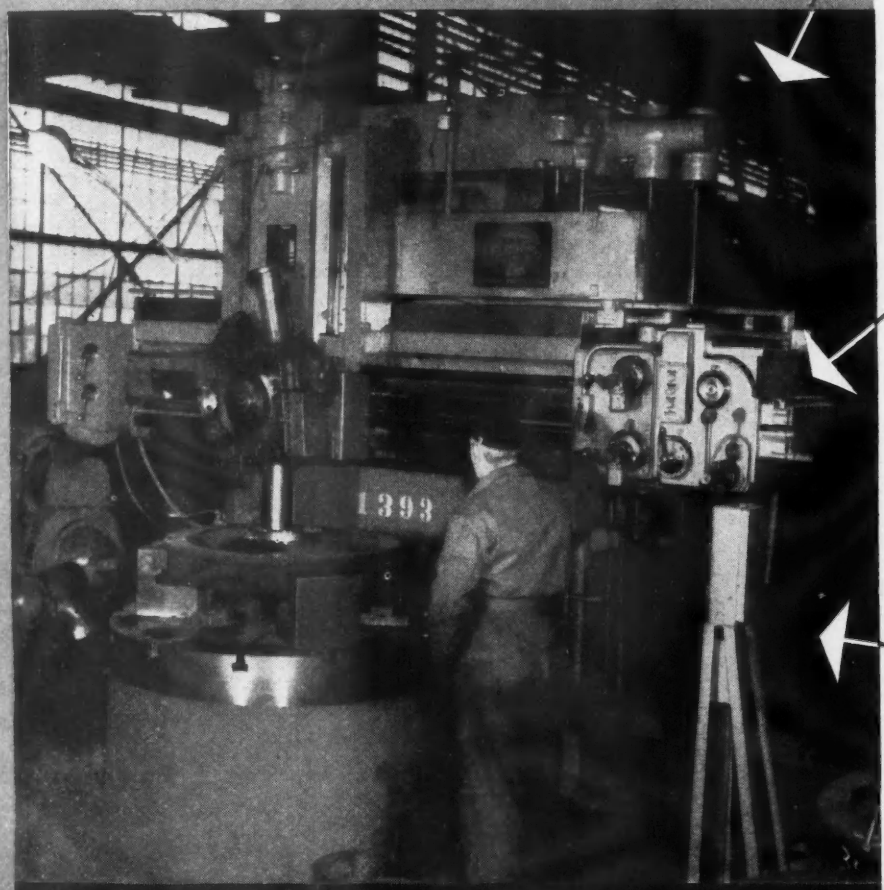
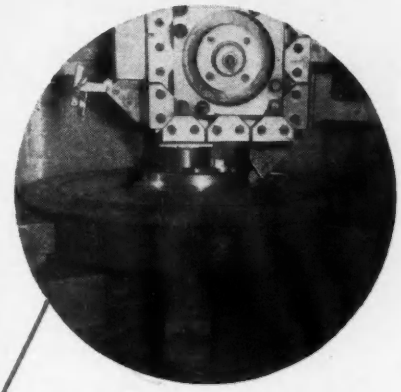
Readers of **AUTOMOTIVE INDUSTRIES** are always well informed

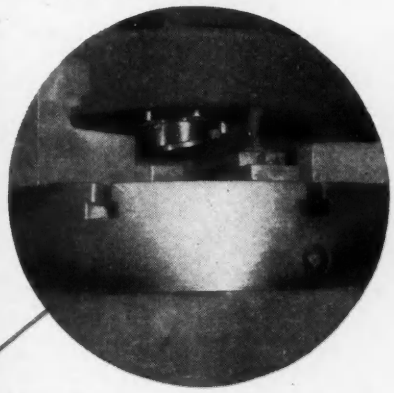
BULLARD MAN-AU-TROL V. T. L. AUTOMATICALLY MACHINES DIESEL WHEELS 3 TIMES FASTER



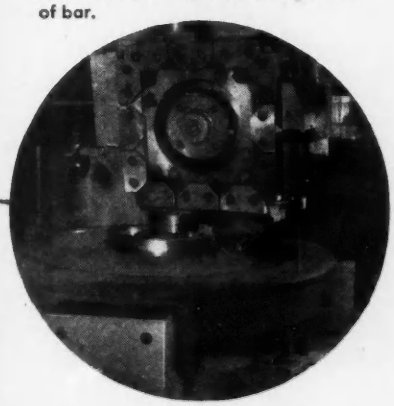
This BULLARD 54" Man-Au-Trol V.T.L. in the B. and M. R. R. shops at North Billerica, Mass., machines a wrought steel Diesel locomotive wheel in less than an hour, three times faster than the previous method. Man-Au-Trol Cuts Time between Cuts and Time on Cuts.



Here the boring tool and turning cutter on B. and M.'s Man-Au-Trol V.T.L. have nearly finished their cuts. When finished, the head moves to the right to straddle face the hub.



View from underside of wheel showing boring tool at end of cut, ready to move to the right to take straddle cut. Note lower straddle cutter on right side of bar.



Here you see the finish of the hub straddle facing operation. Now the head and bar move left to center of bore and rise to index position for next operation.

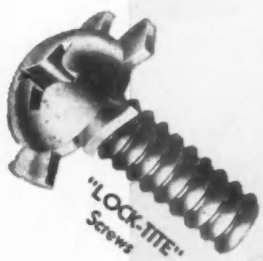
Your investigation of BULLARD Man-Au-Trol for your work will convince you that its combination of versatility, accuracy, productivity, cost-cutting ability is hard to beat. Write for Bulletin MAV-G-1, today, THE BULLARD COMPANY, Bridgeport 2, Connecticut.

BULLARD MAN-AU-TROL MASTER OF THE MACHINE

BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

HOLTITE

Industry's Dependable Source For Every Type Of Fastening



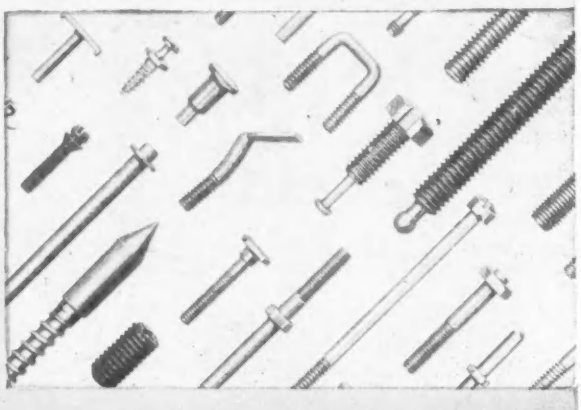
However complex or simple your fastening requirements may be, they can be met by the comprehensive range of standard or special HOLTITE items produced by the Continental Screw Company.

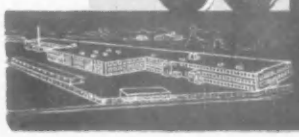
For over 43 years this progressive plant has kept step with the advance of American industry—meeting its current needs as well as anticipating its future requirements. In the extensive HOLTITE plant skilled engineering talent supplements completely modern equipment, Chemical and Metallurgical Research Laboratories, and every modern scientific inspection and testing device. In short, we are equipped with the most capable men, methods and machinery to provide a dependable source for every type of modern fastening. Specify HOLTITE for efficient, economical application in every assembly.

SPECIALS

Frequently, a special fastening or part designed for a particular purpose will replace several standard fastenings or parts and effect definite savings in labor and material costs.

We have complete facilities for producing specials exact to your specifications, blue prints or samples.





CONTINENTAL SCREW CO. New Bedford, Mass., U.S.A.

Business in Brief

Written by the Guarantee Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

Moderate reductions in general business activity are indicated. The *New York Times* index for the week ended July 3 stands at 141.8, as against 149.7 for the preceding week and 134.2 a year ago.

Sales of department stores during the week ended July 3, as reported by the Federal Reserve Board, equaled 264 per cent of the 1935-39 average, as compared with 263 in the week before. Sales were 27 per cent above the corresponding distribution a year earlier, as against a preceding similar excess of seven per cent. The total in 1948 so far reported is seven per cent greater than the comparable sum in 1947.

Electric power production increased more than seasonally in the week ended July 10. The output was 5.1 per cent above the corresponding amount in 1947, as compared with a similar advance of 23.3 per cent shown for the preceding week.

Railway freight loadings during the week ended July 3 totaled 757,366 cars, 14.8 per cent less than the figure for the week before but 20.4 per cent above the corresponding number recorded in 1947.

Crude oil production in the week ended July 10 averaged 5,480,400 bbl daily, 3400 bbl more than the preceding average and 435,050 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended July 3 is estimated at 3,470,000 net tons, 76.5 per cent more than the comparable amount a year ago. The total production in 1948 so far reported is 8.7 per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended July 15, according to *Engineering News-Record*, is $126,589,000, or 25 per cent less than the preceding weekly figure but 21 per cent above the comparable sum in 1947. The total recorded for 29 weeks of this year is 28 per cent more than the corresponding amount in 1947. Private construction is 12 per cent above that a year ago, and public construction has increased by 47 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended July 3 stands at 166.7 per cent of the 1926 average, as compared with 148.0 a year ago.

Member bank reserve balances increased $195 million during the week ended July 7. Underlying changes thus reflected include an advance of $343 million in Reserve bank credit and a decline of $87 million in Treasury deposits with Federal Reserve banks, accompanied by a rise of $242 million in money in circulation.

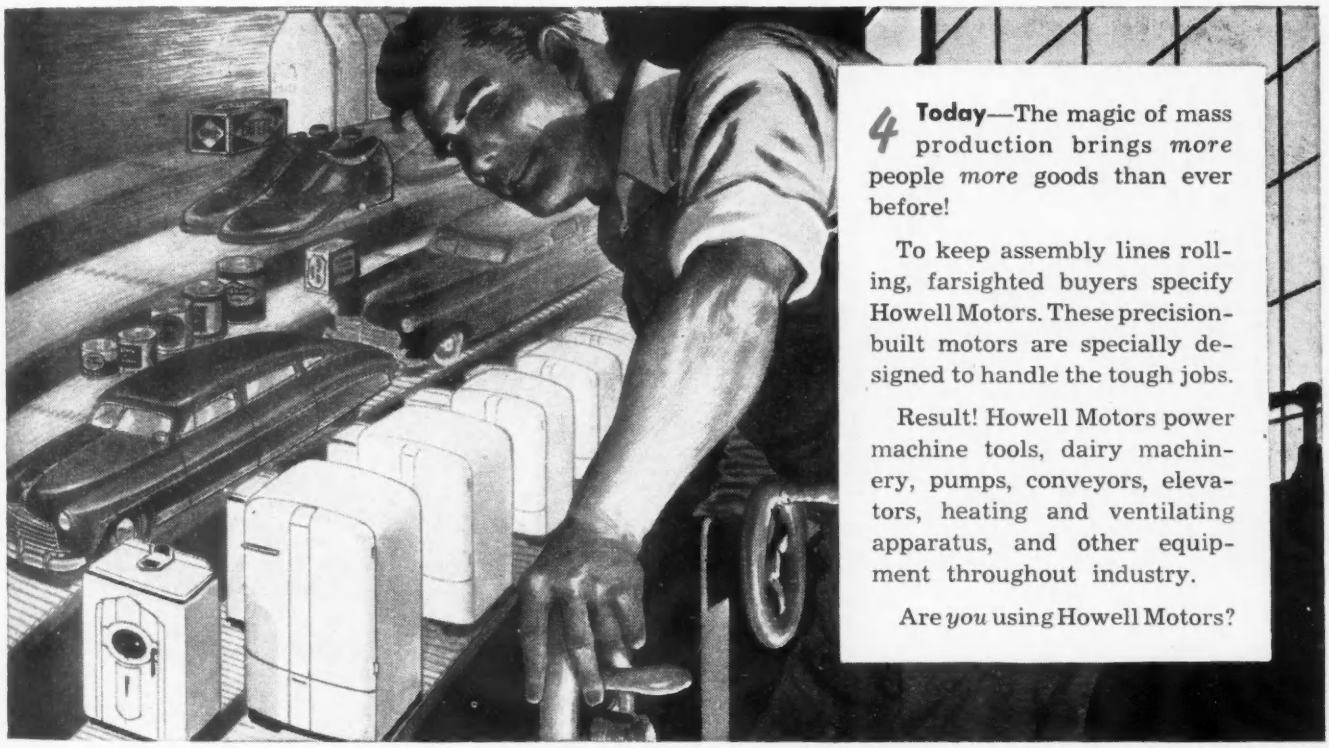
Total loans and investments of reporting member banks decreased $40 million during the week ended July 7. An increase of $58 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $14,403 million shows a net increase of $2,546 million in 12 months.

1 1780—Already the newly created Republic felt stirrings of the industrial greatness ahead. A Connecticut hat maker, for example, experimenting with *techniques* of increased production, pushed output to three a day.

2 1876—Mechanical marvels by the thousand at the Philadelphia Centennial dramatically spotlighted America's ability to invent, design, produce. Industrial stage was now set for impact of low-cost electricity, soon to come.

3 1915—Howell "Red Band" Electric Motors appeared! Soon, these rugged, industrial-type motors won recognition in hundreds of vital industries. Assembly lines were on the move! Ford produced its millionth car!

MASS PRODUCTION . . . AMERICA'S MIRACLE!



4 Today—The magic of mass production brings *more* people *more* goods than ever before!

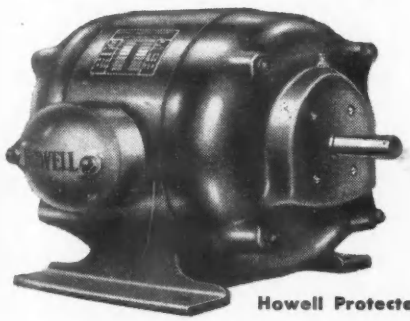
To keep assembly lines rolling, farsighted buyers specify Howell Motors. These precision-built motors are specially designed to handle the tough jobs.

Result! Howell Motors power machine tools, dairy machinery, pumps, conveyors, elevators, heating and ventilating apparatus, and other equipment throughout industry.

Are *you* using Howell Motors?

Free enterprise with mass production raises the standard of living—provides more *goods for* more *people at less cost.*

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



Howell Protected Type Motors

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

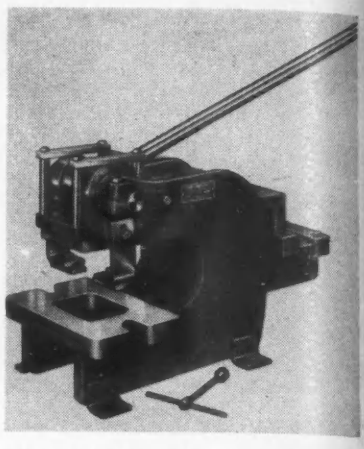
NEW EQUIPMENT

(Continued from page 50)

M-26—Improved Punch Press

The Leslie Welding Co., Chicago, Ill., is introducing an improved hand punch press, Model A, which has no ram, ways, or slides, yet has the accuracy of a leader pin die set. Of all steel and welded construction, it is said to be especially adapted to blanking operations on sheets of any type material. It is claimed to be practical for use in blanking operations which would ordinarily call for power press set-ups.

Positive die alignment is maintained by the aligning leaf assembly, to one end of which the punch is fastened. The other end of the aligning leaf assembly is attached to the press frame by means of a flat spring serving as a pivot when the punch is raised and lowered. Because of the rigidity of the leaf assembly, except at its flexing point, and crankshaft construction that applies pressure to the leaf at two widely separated points, it is unnecessary to center the load on the punch plate.

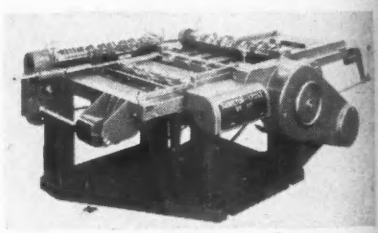


Model A, Leslie hand punch press

Designed to accommodate most blanking punches ordinarily used on small power presses, the punch plate is 4 in., front to back, and 4⅜ in., right to left. The press has a throat depth of 6 in., a stroke of 6/17 in. with adjustment of ⅛ in. Die space, stroke down adjustment up, is 4¼ in.; hole in bed is 3⅛ in., front to back, and 4½ in., right to left. Press capacity is 3 in. dia hole through 16 ga mild steel or 2 in. dia hole through 12 ga mild steel. The capacity can be exceeded by employing a pipe extension on the press handle.

M-27—Heavy-Duty Blank Slitter

A new heavy-duty duplex body blank-slitter designed for plain iron or tin sheets having a maximum thickness of approx. 0.017 in. is offered by Lima-Hamilton Corp., Hooven, Owens, Rentschler Co. Div., Hamilton, Ohio. Known as the Hamilton-Kruse No. 301, this 36-in. machine has an operating speed of 50 sheets a minute or slower, depending on requirements.



Hamilton-Kruse No. 301 heavy-duty duplex body blank-slitter.

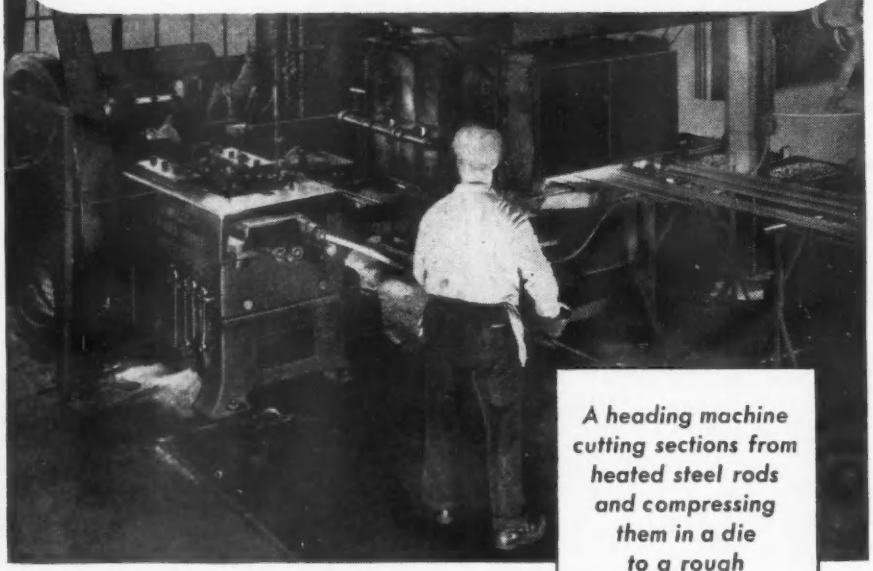
Cutters supplied with the machine are high-carbon, high-chrome forged steel.

The slitter will trim and slit sheets up to 36 in. square into strips on the first unit, and then automatically trim and slit the strips into body blanks on the second unit.

Sheets are fed from the first operation to the second on the same plane and are fully controlled by automatic

This is How

STROM BALLS are Born



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

Strom BALLS Serve Industry

Largest Independent and Exclusive Metal Ball Manufacturer

CONSTANT SPEED CONTROL

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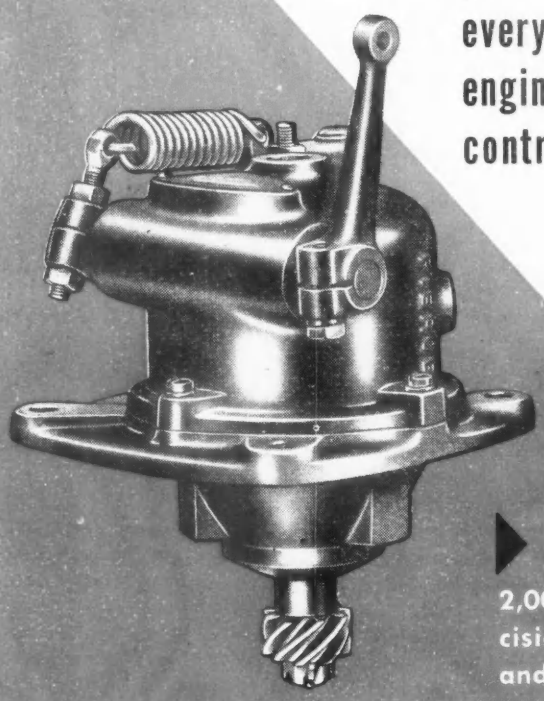
your answer to every problem of engine or vehicle control



Pierce is the world's largest governor manufacturer — offering more than 2,000 different assemblies of Pierce Precision Governors, Pierce Servo Governors and Pierce Road-Speed Governors for gas, gasoline and diesel engines.

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hold-downs which guarantee perfect registry and minimum scrap. This slitter can be arranged for plain material or lithographed sheets, and can be hand-fed or operated in conjunction with an automatic sheet feeder. This last set-up, the company states, requires only a laborer to load the feeder.

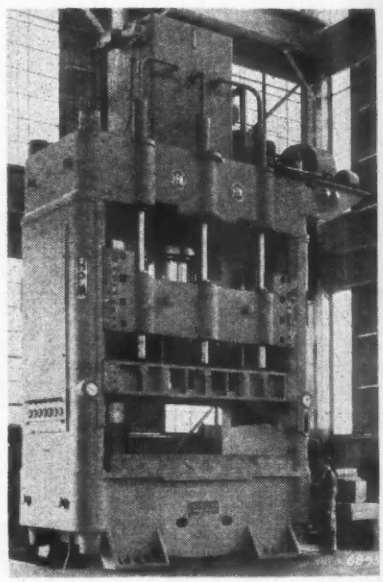
Floor space occupied by the machine measures 132 in. by 90 in., front to back by right to left, including grinding attachment. Approximate net weight, including the grinding attachment, is 7,270 lb. The unit stands approximately 40 in. high, from floor to top of feed table.

M-28—Sheet Metal Drawing Press

One of the largest hydraulic sheet metal drawing presses ever built for export is this "giant" 1000-ton double-action H-P-M press manufactured by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. To be used by a prominent foreign automobile builder for drawing automotive body parts, it weighs 350,000 lb with pressing surfaces 144 in. x 84 in. Sheet metal parts up to 22 in. deep can be drawn in a single operation using either single or double action dies. All press actions—punch, blankholder and cushion—are hydraulically operated. Blankholder slide is located directly below the main punch carrying slide. Die cushion platen in the press bed is 124 in. by 60 in. with a maximum stroke of 24 in. Main slide, blankholder and die cushion pressures are 1000, 400 and 250 tons respectively. A single H-P-M hydro-power variable displacement hydraulic pump generates pressure.

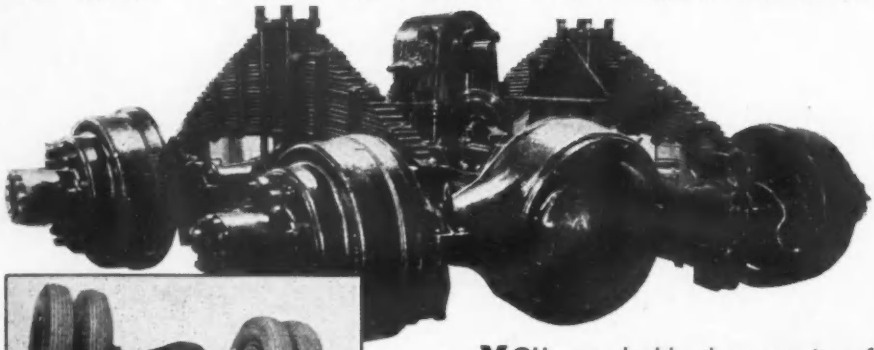
Some of the operating features of this large press are: adjustable, independent pressure control for each pressing member; constant drawing speed throughout the entire stroke with maximum pressure obtainable at any point within the limits of the press ram travel; blankholder pressure is independently adjustable at six points on the periphery of the blankholder slide.

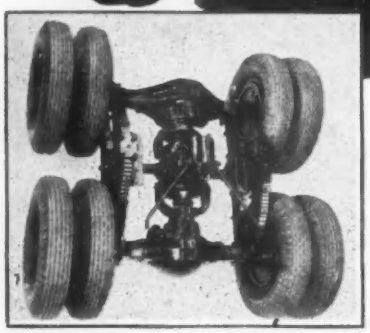
The press can be fitted with many types and sizes of dies for either single or multi-die operations. Blanking, drawing and embossing can be done in a single press stroke. Precision inching control permits quick and easy die set-up. The steady squeeze of hydraulic pressure is said to create ideal drawing conditions with no impact when the draw punch contacts the blank, and with metal permanently set at the bottom of the stroke, eliminating spring-back in the drawn part. The press reverses itself at either a predetermined position or pressure. It is claimed to represent one of the first full hydraulic designs ever used for automobile body production, with a fast cycle speed.



1000-ton sheet metal drawing press of the Hydraulic Press Mfg. Co.

How to double your payload with TUTHILL SPRINGS





To eliminate (1) axle fight on rough ground; (2) need for declutching one drive axle in high-speed highway hauling—Thornton has special No-Spin differential in 2-speed gear case. No-Spins also in each rear axle to give positive drive to each rear wheel. With 5-speed truck transmission, driver has 20 speeds forward! Note the 4 massive Tuthill leaf springs.

Double "walking-beam" springs are provided by Tuthill. The springs pivot about a trunnion, and enable bogie to follow the roughest terrain. Load and road shock is tremendously reduced, and floatation of load is always evenly distributed. Powerful pairs of Tuhill alloy steel leaf springs easily support the doubled payload.

YOU can double the capacity of a single rear-axle truck by adding an extra, rear driving axle. And that is just what the new Thornton (Detroit Automotive Products Corp.) 4-rear-wheel Drive does for Chevrolet, Dodge, Ford and other medium trucks.

The changeover unit gives 100% more tractive power, 100% more braking capacity, and 100% more payload. To accommodate this doubled load, the unit provides four massive "walking-beam" TUTHILL springs.

These Tuthill springs are built up of 24 heavy alloy-steel leaves. On the unit shown above, they handle 38,500 lbs. (GVW) for a truck, and 58,000 lbs. for a tractor trailer. In addition, the Tuthill springs have ample reserve strength to take the sometime tremendous overloads momentarily caused by jolts in the road.

You can use carefully engineered Tuthill springs to equal advantage in your own frame and body work. Let the Tuthill engineering staff help you select the springs best suited to your needs. There is no obligation. Just drop Tuthill a note.

Quality leaf springs for 68 years
REQUEST DETAILS

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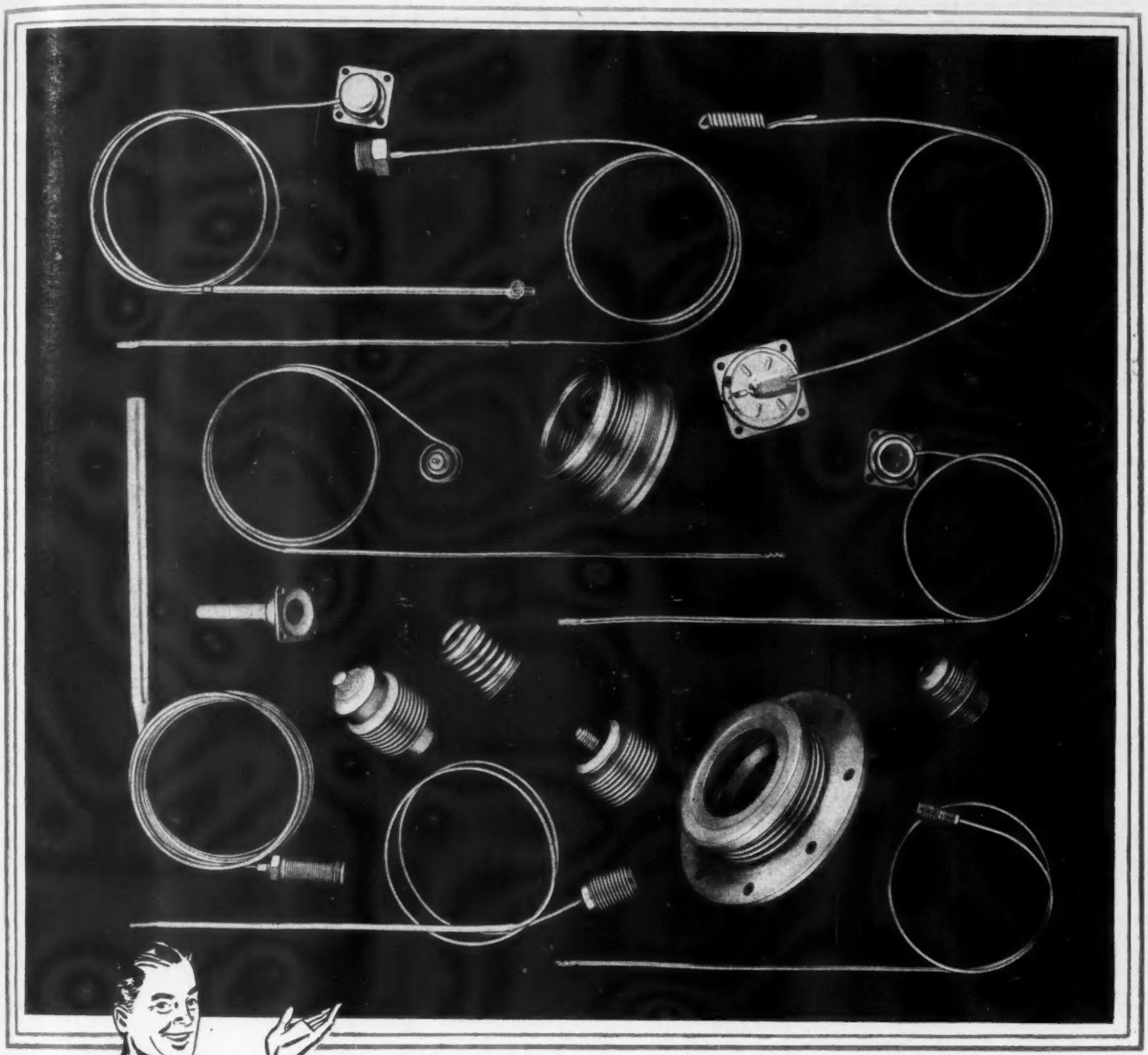
Spring Company
760 West Polk Street
Chicago 7, Illinois



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BELLOWS ASSEMBLIES *was a different problem. How different is yours?*

If you merely suspect that a bellows assembly can do your job, you're in the same position where some of our most satisfied customers started. Our engineering department will be glad to analyze *your* problem, too. Send *your* sketches and specifications for confidential study and recommendations. CLIFFORD MANUFACTURING COMPANY, 563 EAST FIRST STREET, BOSTON 27, MASSACHUSETTS. Offices in Detroit, Chicago and Los Angeles. *First with the Facts on Hydraulically-Formed Bellows.*

CLIFFORD Feather Weight

ALL-ALUMINUM OIL COOLERS FOR AIRCRAFT ENGINES

HYDRAULICALLY-FORMED BELLOWS AND BELLOWS ASSEMBLIES

HYDRON Metal Bellows

Men at Work

in the private offices and in all corners of automotive and aviation industrial manufacturing plants, influence the buying of materials, tools, machinery and equipment.

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reaches men whose names you'll never know — but whose recommendations may mean millions to you.

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Short Run Dies at Flxible Co.

(*Continued from page 47*)

which, eventually, sent Flxible management in search of more permanent surfacing, even on short-run dies. After the average production run, say of several hundred body panels, the maple dies required sanding, and in some cases covering with sheet metal to prolong their life. If maple dies are kept in storage for some time, the joints may become dried out, making resurfacing necessary.

In addition, many wood dies to be used over a comparatively lengthy period of time are reinforced with steel bolts and rods through their length and width. This is another factor taken into consideration in the search for other die-making material, such as concrete. Still another maintenance measure on maple dies used time and time again has been the reinforcing of critical edges of the die with steel strips.

Some time ago Flxible engineers tackled the maintenance problem of such dies by experimentation with impregnated, sheet glass coverings on the drawing surfaces. This procedure was evolved:

Fiberglas material of 128, 164 and 114 weave, about 30-in. in width and 1,000 yd in length, according to need, was purchased. The laying up of these sheets on dies varies with the pressure to be used in the press-work. For instance, if 75 tons pressure is to be used, the sheeting might run 1/16-in. total thickness. Weaves vary from about 0.010-in. to 0.040-in.

Before application of sheeting to the dies, the layers are impregnated with resins, specially prepared at Flxible to shorten the curing time. A catalytic agent, about 50 per cent benzoyl peroxide, is mixed in with the resin for this purpose. After laying up of the die, it is enclosed in PVA cloth (about 0.003-in. thick, resembling cellophane), to make a vacuum bag. About 26-in. vacuum is drawn, holding the glass to the die form and keeping air out.

After the vacuum is obtained, the pump is removed and the die, still in the bag, is baked to sure the application. Baking time varies around 30-min, according to the thickness of individual applications. After baking, the die is allowed to cool and minute changes in the drawing surface are made, as required, by filing. In contrast with the ordinary wood die maintenance, necessitated by humidity conditions that bring an expansion and contraction of joints, the glass-covered die is used at Flxible for two years with no maintenance.

This brings us to concrete-and-glass die construction, noted above as the latest venture at Flxible. The first stage of such construction is the building of a mock die, according to body contours required, of plywood running from ¾-in. to ½-in. in thickness. Over the mock, sheet metal is skillfully hammered flush to the die surface requirements.

At this stage, the mock is sent out of the plant to a local pottery where ordinary plaster of Paris is cast over the mock die. When the plaster has hardened, the whole is returned to Flxible. The mock is then removed from the plaster cast, and Portland cement is mixed and poured into the cast. After it hardens and is removed from the cast, it is ready for application of glass sheeting.

The glass might run to about ⅛-in. thickness, again depending upon the use to which the die will be put, pressure and so forth. A special glue is used to adhere the glass to the concrete surface. Another consideration in concrete-and-glass construction is the insertion of steel angles and rods for reinforcing the concrete when exceptionally heavy presswork will be involved, with deep contours, etc.

All dies are carefully stored in suitable racks to prevent scarring of critical surfaces. Two men, using chain blocks, can handle the ordinary wood die. Concrete dies are fork-trucked to storage and rested on 2 by 4's. Wood dies with steel inserts are further protected with wood plugs that fits the inserts.

Classified Advertisements

MALE HELP WANTED. To call on garages, filling stations with $24.50 quality wheel balancer. Competing models $300 to $2000. Virgin market. Five minute demonstration means sales. $10 cash commission. Twenty sales per day possible. Exclusive territory. Write A. L. Brown, B. & B. Mfg. Co. Box 3-816, Sioux City, Iowa.

WANTED: Manufacturers' Representatives in restricted territories to expand sales of well established vibration-proof fitting for thin wall tubing in the aviation and automotive fields. Chicago Forging & Mfg. Co., 2000 Southport Ave., Chicago, Ill.

Readers of
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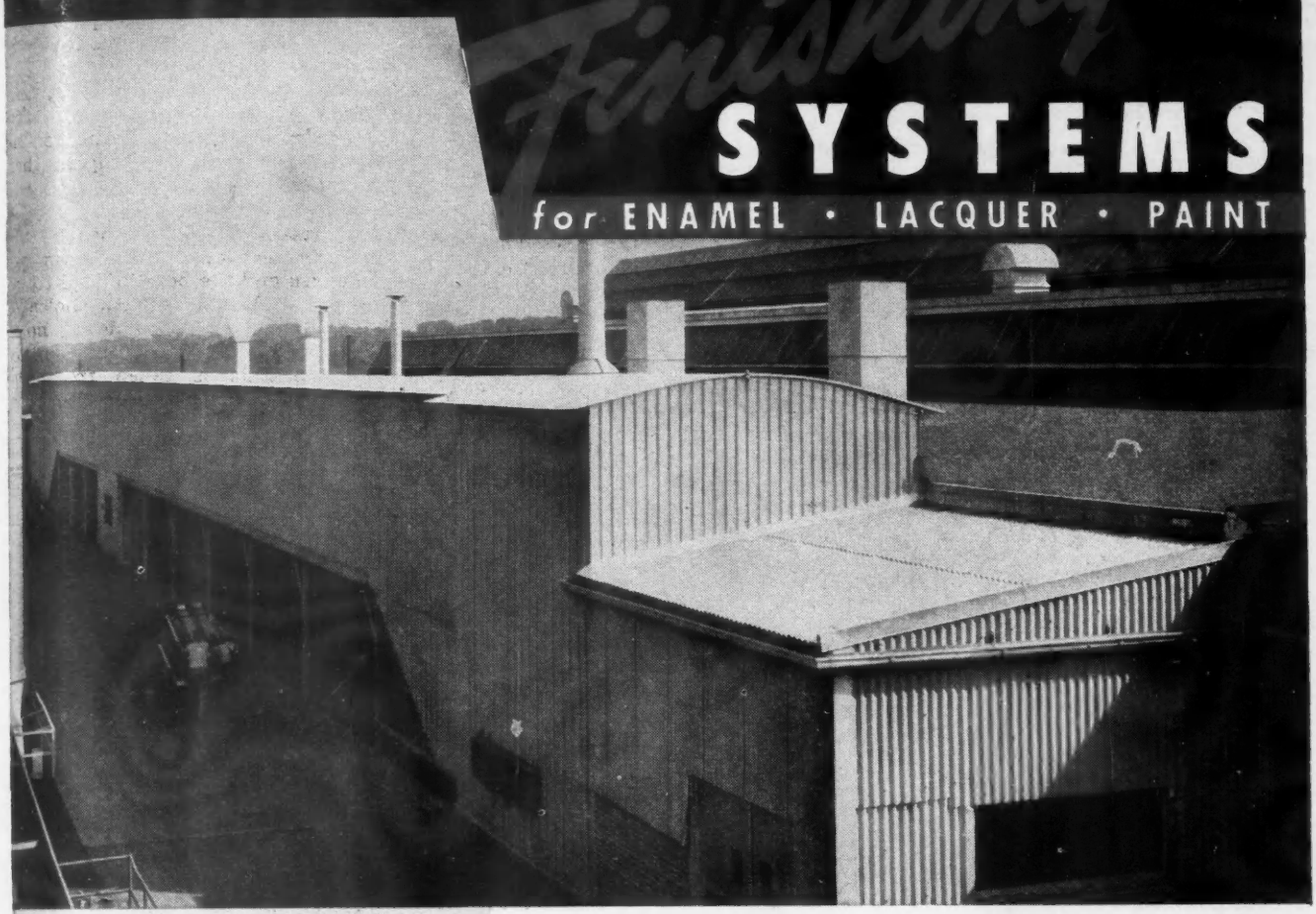
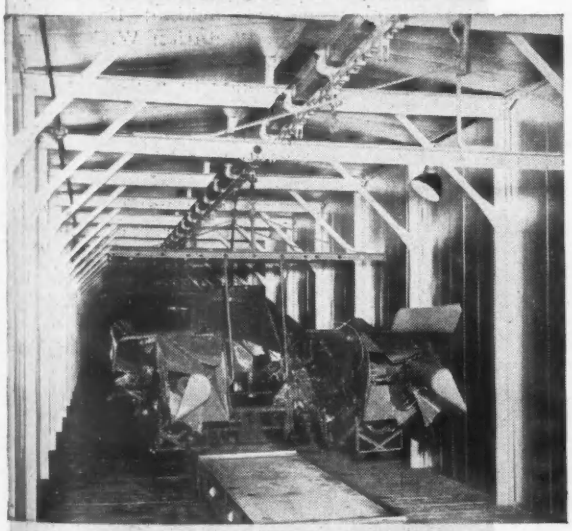
COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



Mahon Finish Baking Oven Built Outside of the Plant Adjacent to the Building Housing the Remainder of a Complete Mahon Finishing System at the East Moline Plant of John Deere and Company. The Complete System includes a Six Stage Metal Cleaning and Rust Proofing Machine, Dry-off Oven, Hydro-Filter Spray Booths and the Finish Baking Oven Illustrated Above.



Interior of the Mahon Finish Baking Oven, Illustrated Above, Showing a John Deere Double Row Corn Picker Carried on a Continuous Overhead Trolley Conveyor.

Oven Installation Outside of Plant Saves Valuable Manufacturing Space!

In order to save valuable floor space inside of the plant, and to obtain an efficient oven design unhampered by restrictions normally encountered in planning ovens inside of industrial plants, this finish baking oven, which is part of a complete Mahon Finishing System, was installed outside, adjacent to the building housing the remainder of the system. This is another example of Mahon Planning and Mahon Engineering. When you are considering new finishing equipment, remember that in a Mahon system you get better planning, better engineering, and therefore a better finish at lower cost . . . because, twenty-seven years of experience, pioneering development, and constant research, in this highly specialized field, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon Insert in Sweet's Mechanical Industries File for complete information, or arrange consultation with Mahon engineers.

THE R. C. MAHON COMPANY

Home Office and Plant, Detroit 11, Mich. • Western Sales Division, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems including: Metal Cleaning Machines, Rust Proofing Machines, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Units, and Drying and Baking Ovens. Also Paint Reclaiming Units, Hydro-Foam Dust Collectors, and many other Units of Production Equipment.

MAHON

Ford's Transfer Machines

(*Continued from page* 41)

Station	Operation
9	Drill 2 control shaft holes halfway. Drill control arm screw hole.
10	Drill 2 control shaft holes, second half and countersink one control arm screw hole.
11	Bore 2 control shaft holes 0.622 in. diam.
12	Rough counterbore and face oil seal seats for control shaft holes.
13	Finish counterbore and face oil seal seats for 2 control shaft holes.
14	Finish ream 2 control shaft holes 0.625 in. diam.
15	Tap one control arm screw hole.
16	Unload.

One of the outstanding features of the equipment is the method of transferring, locating and clamping the work. The function of the transfer is to give the parts only approximate location; accurate location and clamping are accomplished in the various individual fixtures.

At the loading station the parts are placed into two slots; one at the top and one at the bottom, which extend through the entire machine and guide the part from beginning to end. Lengthwise the parts are between fingers which are attached to the pivoting transfer tube. This transfer tube also extends the length of the machine and has 30 equally-spaced fingers. When the tube moves forward, all parts are advanced one station. The tube then pivots on its axis, taking the fingers out of engagement with the parts, and returns to the starting position. The fingers then rock back into engagement and two more parts are inserted.

Accurate and final location by the fixture in the first station is from two side edges and the bottom edge to insure proper location for the holes in the flange. After two dowel holes are reamed in the second station, accurate location is taken from the reamed holes for all succeeding stations.

Another point of interest is the method used to dispose of the chips. The chips fall into a trough located directly below the transfer tube. Attached to the tube are paddles which automatically convey the chips as the transfer tube moves. The chips are moved in this fashion to three conveniently located outlets in the side of the base.

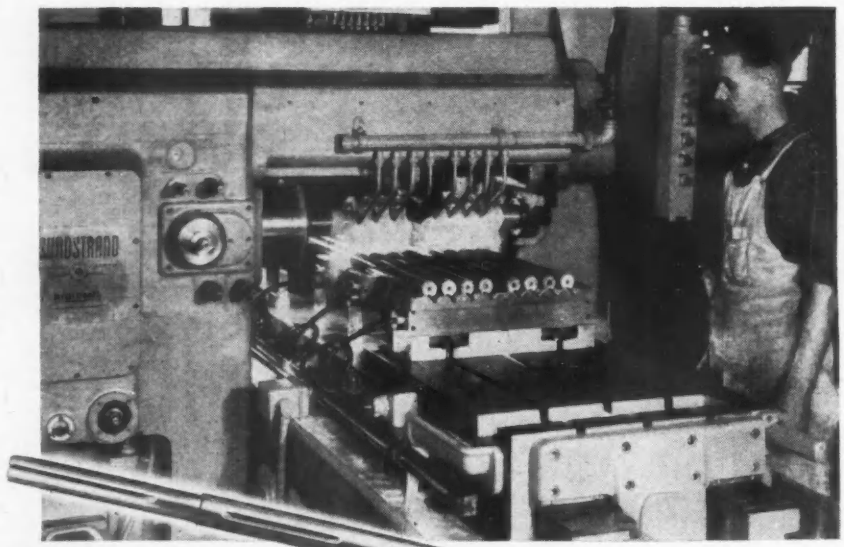
A feature is the automatic tap cleaning and lubricating device. At the completion of each cycle, a blast of air is directed at each tap and a vaporizing device attached to the air supply introduces a small amount of oil into the air stream. Thus as the taps are blown free of chips they are at the same time lubricated.

The transmission case is a part normally requiring a considerable number of individual machine settings for its completion. In the new layout they have several initial operations preceding the first section of the transfer machine; then a trip through the 18-station W. F. & John Barnes transfer machine; finish-facing of both ends in a 6-spindle Bullard Contin-U-Matic; followed by a trip through the second W. F. & John Barnes transfer unit having 10 stations.

Machining starts with the rough- and semi-finish-boring of the two bearing bores in a No. 918 W. F. & John Barnes boring machine; and the rough- and semi-finish-milling of both ends in a Davis-Thompson special mill. The latter is of single drum type fitted with 12 fixtures. Next follows the rough- and finish-milling of the cover face in another of the special Davis & Thompson mills, this one having a double drum with 24 fixtures.

The case now is ready for processing through the first unit of the W. F. & John Barnes progressive type transfer machine. As noted below this unit has 18 stations, of these Station 1 being for loading and Station 18 for unloading; while Stations 6 and 7, 9 and 10, and 15 and 16 are idle. The sequence of operations through this unit is as follows:

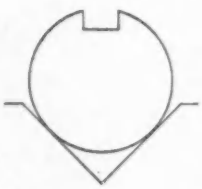
(*Turn to page* 92)



Milling Keyways

EASIER — FASTER

***with* Power-Grip Holding**



Photograph shows eight shafts held with POWER-GRIP CHUCKS. Four keyways 5" x 1/2" x 1/4" deep are milled in each shaft. Shaft is 1-5/8" dia. with ends 1-1/2" dia. Cutters are 6" dia. staggered tooth H.S.S. side mills. Feed rate is 5" p.m., and rapid traverse 300" p.m. Diameters down to 11/16" are milled in same fixture.

For milling keyways in large or small shafts, shafts with multiple diameters, in production quantities, or short runs of mixed sizes, Power-Grip Chucks and Fixtures represent a modern magnetic holding technique. Deep magnetic penetration, accomplishing extreme holding power with low voltage, makes possible fixtures adaptable to a wide range of sizes.

Send us prints of your keyway or other milling jobs, so we can submit our proposal for Power-Grip Holding.

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1314 18th Avenue, Rockford, Illinois

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IT'S THE ROAD TO SUCCESS...

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WITH NEEDLE RETAINERS

FOR THE AUTOMOTIVE INDUSTRY

loose needles

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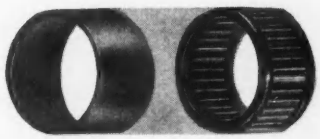
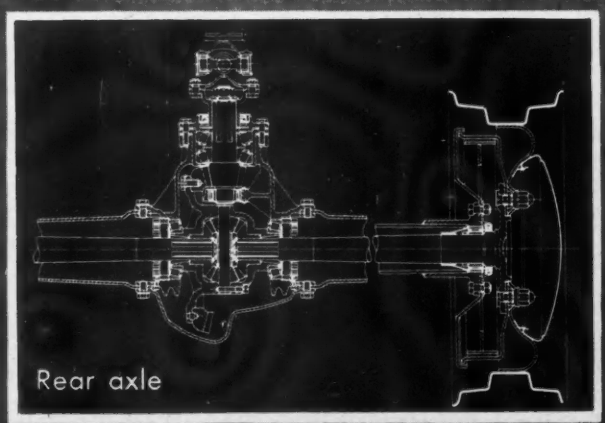


complete bearings

Special details on request



Rear axle

Ste Ame des ROULEMENTS A AIGUILLES

15-17 Rue GUSTAVE EIFFEL

NADELLA

LEVALLOIS-PERRET (Seine) FRANCE

ACTA

Station	Operation
1	Load.
2	Left hand unit, drill 4 holes.
	Right hand unit, drill 4 holes.
3	Left hand unit, drill 5 holes and ream 2 holes.
	Right hand unit, drill 2 holes.
4	Left hand unit, chamfer 4 holes.
	Right hand unit, drill 1 hole.
5	Left hand unit, idle.
	Right hand unit, chamfer 4 holes.
6 & 7	Idle.
8	Left hand unit, rough gun bore countershaft hole.
	Right hand unit, rough gun bore countershaft hole and rough gun bore idler shaft hole.
9 & 10	Idle.
11	Left hand unit, finish bore bearing hole.
	Right hand unit, finish bore bearing hole.
12 & 13	Chamfer.
14	Left hand unit, finish gun bore countershaft hole.
	Right hand unit, finish gun bore countershaft hole and idler shaft hole; also finish ream hole.
15 & 16	Idle.
17	Left hand unit, tap 4 holes.
	Right hand unit, tap 4 holes.
18	Unload.

It is of special interest to note that the unit described above contains the equivalent of two double-end precision boring machines. The first of these—at Station 8—is for rough gun drilling of the countershaft and idler shaft bores, previously rough-bored; while Station 14 finish-bores these to complete the operation.

As the case is unloaded from Station 18 it is transferred to the adjacent Bullard Contin-U-Matic—of 20-in., six-spindle type—for finish-facing both ends. In principle Ford rough- and semi-finish-mills these faces initially, leaving a small amount of stock for finish-facing. By this method the scratches and score marks which may be developed along the machining line are removed at the same time these faces are trued.

The cases now are ready for processing through the second W. F. & John Barnes transfer unit, which has ten stations for a series of operations on the cover face and bottom face. The sequence of operations in this unit is as follows:

Station	Operation
1	Left hand unit, drill 9 holes in cover face.
	Right hand unit (angular), drill pin hole part way through in bottom face.
2	Left hand unit, chamfer 9 holes in cover face.
	Right hand unit (angular), drill pin hole through in bottom face.
3	Right hand unit, drill hole for pipe tap in bottom face.
	Left hand angular unit, drill pin hole through in cover face.
4	Left hand unit, counterbore 1 hole.
	Right hand angular unit, drill pin hole through bottom face.
5	Left hand angular unit, drill pin hole through in cover face.
	Right hand unit, idle.
6	Left hand unit, tap 5 holes in cover face.
	Right hand unit, tap 1 hole in bottom face.
7	Turn fixture 90 deg.
8	Left hand angular unit, drill 1 hole.
	Right hand unit, drill 1 hole in side.
9	Left hand angular unit, ream vent hole.
	Right hand unit, tap 1 hole in side.
10	Unload.

The cases now are completely finished except for several detail operations. First of these is the milling of countershaft bosses on the inside which is done in a Kreuger mill, while the spot-facing of the idler boss on the inside is done in two steps in 24-in. Sibley drills.

Million and Half Bearings

(*Continued from page* 29)

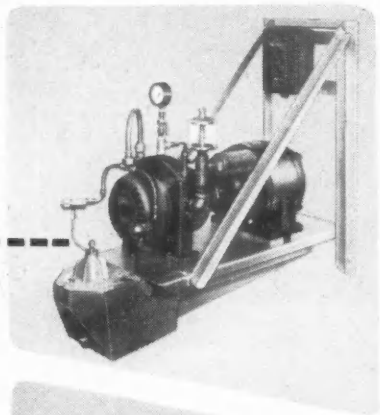
lines. Each row of grinders is connected by a common trough, exposed to the atmosphere, each grinder having its cutting fluid outlet directed into the trough. Each trough is pitched slightly to one end of the department and all troughs dump their loads of fluid continually into a reservoir. From here the fluid is pumped up to one of several large open troughs running at mezzanine height. These main trunk lines transport the fluid to a large central filtering system consisting of a settling tank of ample proportions which affords plenty of time for the heavy particles to settle to the bottom. Meanwhile, the fluid is being constantly agitated and aerated and the fines that reach the surface are skimmed off. At the same time the fluid is passed through a battery of filters to remove such impurities as are not removed by settling.

THEY MADE AIR DO THE WORK—THROUGH

*Visioneering**

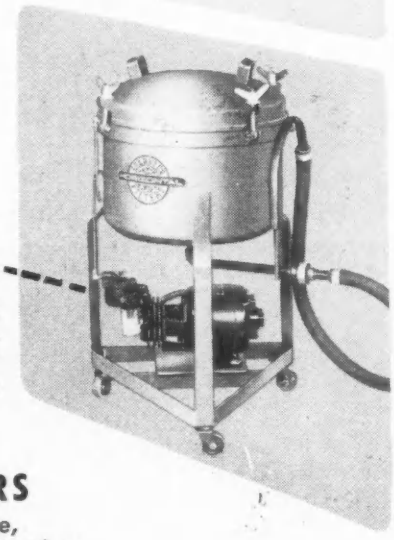
ON A HUMIDITY CONTROL UNIT

Here's Visioneering by designers of a Humidity Control Unit for bakery proof-rooms. To atomize water a Gast Rotary Compressor, as original equipment, supplies "pulseless" air pressure. Unit holds room air at 98% humidity. Direct drive, ¾ H.P. Rating is 8½ C.F.M., pressure to 25 lbs.



ON A FILTER FOR EDIBLE FAT

On a totally different application, air does the work on another manufacturer's Portable Filter. With pressure to 25 lbs., a Gast Compressor forces fat through filter. Gast Compressor and motor are integral—only 7" x 12". Rating: 1½ C.F.M. with ¼ H.P.



Both USE GAST ROTARY AIR COMPRESSORS

The two machines above are *totally unlike*, although both serve in processing food. Yet they were *visioneered* as *better* products—with Gast Rotary Compressors.

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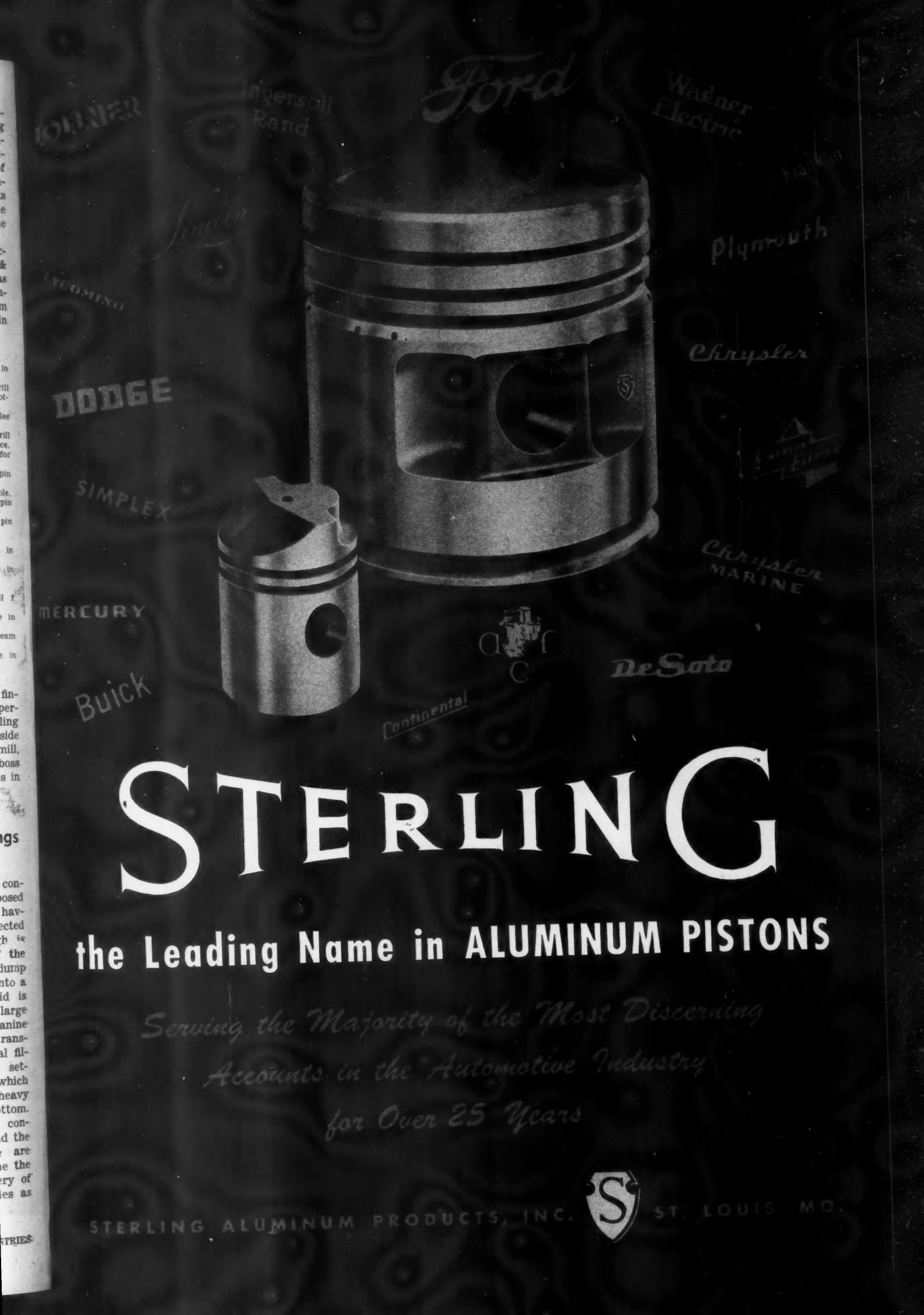
* Broad vision plus engineering skill.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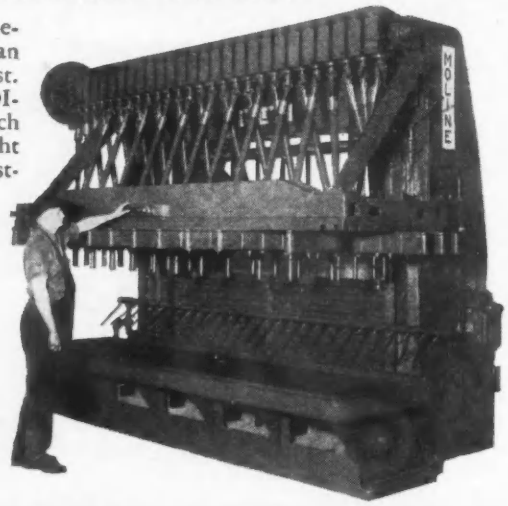


No. HU68
DRILLER

MOLINE TOOL CO. HOLE-HOG MOLINE, ILLINOIS

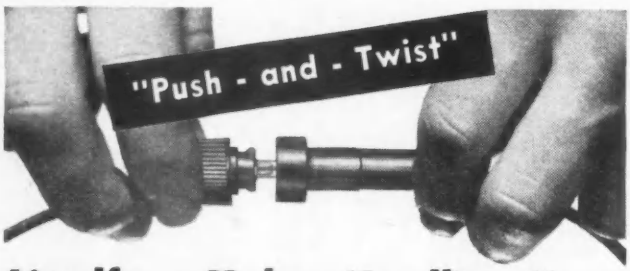
MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

British Car Design Unlikely to Change Soon

Present designs of English motor cars are not likely to be changed soon because steel for new tools and dies must come out of each manufacturer's total steel allocation, according to J. E. MacIntosh, managing director of Briggs Body, Ltd., Dagenham, England, subsidiary of Briggs Manufacturing Co. He is currently visiting the parent company for the first time since 1939 to study new production and engineering methods in the Detroit plants. He said that steel shortages and scarcity of skilled labor are hampering British automotive production. The Briggs subsidiary supplies eight British automobile manufacturers with bodies or stampings, including Ford, Jewett, Standard, Austin, and Humber-Hillman.

Mid-West Tool Moves to Sandusky, O.

The Mid-West Tool & Manufacturing Co. of Detroit has moved its plant and manufacturing facilities and executive offices to Upper Sandusky, O. About twice the operating floor space is available at the Ohio plant, according to the company. Branch offices in Detroit and Chicago will be retained.



Littelfuse Makes Headline News with "In-Line" Fuse Retainer

Littelfuse's latest development: the "in-line" fuse retainer for fingertip ease in fusing. Precisely molded of high impact bakelite and designed primarily for low voltage applications: car radios, heaters, spot lights and other automotive trouble spots where a fool-proof easy-to-handle fuse installation is desired. The strongly spring-locked retainer opens with a "push-and-twist" of the finger tips. Inside, the fuse rests against knife-edged, cup contacts that assure greatest degree of contact with lowest voltage drop. Doubled wall thickness at juncture of shoulder and lower body.

The Littelfuse "In-line" retainer is available in a variety of harnesses to fit your own specifications. Larger opening at either end uses up to #12 standard automotive wire. Available for all standard automotive fuse sizes. Retainer may be had with or without wire leads and terminals, with or without fuses.

FIRST IN CIRCUIT PROTECTION

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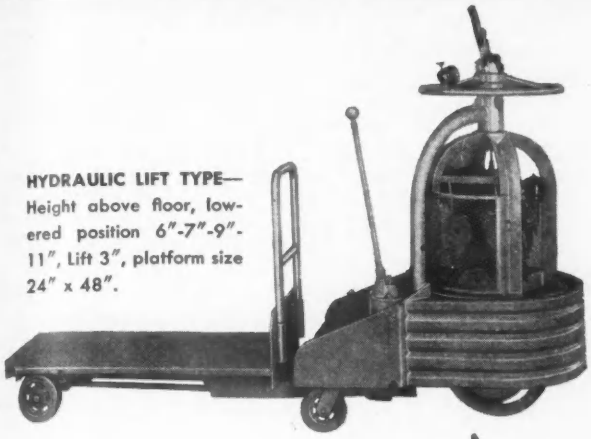
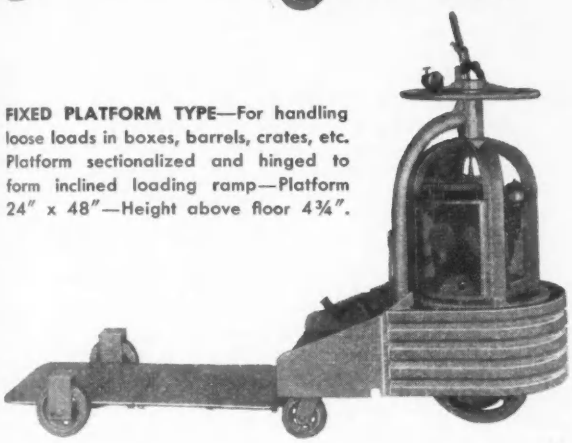


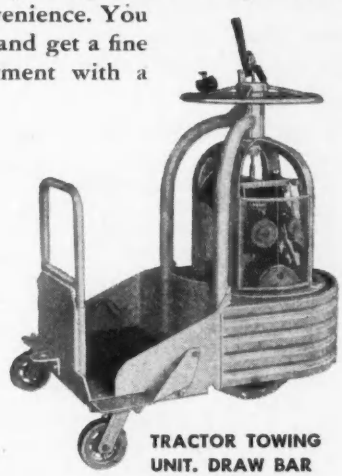
HYDRAULIC LIFT TYPE—Height above floor, lowered position 6″-7″-9″-11″, Lift 3″, platform size 24″ x 48″.



FIXED PLATFORM TYPE—For handling loose loads in boxes, barrels, crates, etc. Platform sectionalized and hinged to form inclined loading ramp—Platform 24″ x 48″—Height above floor 4¾″.

Then look into the LOAD DISPATCHER

And look into your hand trucking or the handling you are doing on too expensive, heavy equipment. Write us and we will try to save you real money with a Load Dispatcher. Four types cover the field—*fixed platform, hydraulic lift, pallet transporter, tractor-towing unit,* each with many money-making features, exclusively Load Dispatcher. Its unique simplicity accounts for its unprecedented low price. There is no transmission, clutch, batteries, radiator. It handles rapidly and controls so easily, as the Load Dispatcher follows the direction in which the operator points the driving wheel—forward, backward, or at any angle either way. It reverses instantly without backing, turning or gear shifting—a marvelous simplicity for any vehicle. Speed, 3 m. p. h. Operator rides. Unusual economy, one gallon of gas an average day. Many features to speed the work and for greater convenience. You can improve your service and get a fine return on a small investment with a Load Dispatcher.



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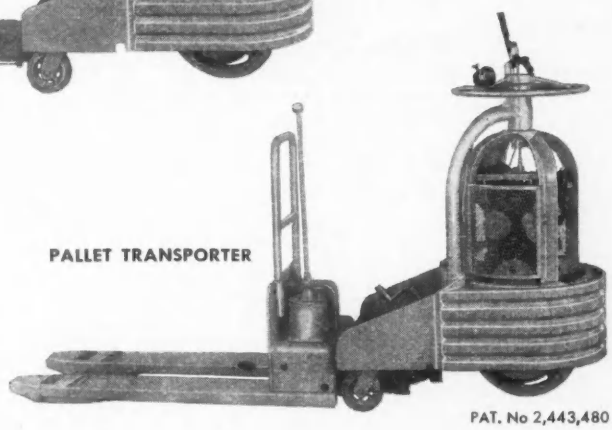

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General News

(*Continued from page 23*)

Ford Appoints Kohr Chief of Engineering Research

Robert F. Kohr has been named director of engineering research for the Ford Motor Co. to fill the post left vacant by the resignation of William S. James. He had been acting director since February, 1947. In his new post he will work under the direct supervision of Earle S. MacPherson, executive engineer. Before joining Ford in May, 1945, he was chief liaison engineer in the aircraft development section for GM. Ford has also announced the appointment of Henry C. Grebe as director of body engineering, a newly created post. He will work under the direct supervision of John Oswald, executive engineer. His duties will include responsibility for all detail engineering drafting on Lincoln, Mercury, and Ford commercial vehicles and tractors and transit buses. Before joining Ford in 1947 he was associated with Fisher body.

FOR { Grease and Oil? / Paint and Enamel? / Insoluble Dirt? / Electrolytic? } Yes!

There's a Specialized DETREX Cleaning Agent for EVERY Cleaning Job!

There's a Detrex solvent or cleaning compound for *every* cleaning application—a *specialized* cleaning agent, scientifically designed for maximum speed and economy. These include:

DEGREASING SOLVENTS for . . .

- *Both ferrous and non-ferrous metals, and adverse operating conditions,* where maximum stability is called for—PERM-A-CLOR, the most highly stabilized of all trichlorethylene solvents.
- *Average applications*—TRIAD (identical to Perm-A-Clor in cleaning power).

ALKALI AND EMULSION CLEANERS for . . .

- *Aluminum* parts and *painted surfaces.*
- *Brass, aluminum* and *white metal* parts.
- *Heavy-duty* cleaning of *iron and steel* and their alloys.
- Cleaning and neutralizing prior to *Vitreous enameling.*
- *Electrolytic cleaning* especially for plating.
- *Heavy-duty stripping* of pigmented oil paints, synthetics, and baked enamels.
- *Removing all kinds of oils and insoluble dirt,* without attack on surface or coating.

. . . **AND** there are Detrex degreasers, parts washers and dip tanks to most efficiently use these specialized compounds, assuring 100% soil-removal with minimum time and cost. A Detrex field representative can help you on *every* industrial cleaning application.

Degreasing Machines and Safety Solvents • Metal Parts Washers • Alkali and Emulsion Cleaners and Strippers • Processing Equipment • Spray Booth Compounds

SA 4-48

DETREX Corporation

DETROIT 32, MICHIGAN

Make CED Permanent Organization

The Trustees of the Committee for Economic Development, New York City, recently voted to make it a permanent organization. W. Walter Williams has been elected as the new chairman.

Farm Trucks Loom Large in Studebaker Study

The importance of the farm market is revealed in a study made by Studebaker Corp. showing the distribution of its 1947 truck sales. Farmers purchased 19.8 per cent of all trucks made by the company last year, the survey indicates. Contractors were next with 12.6 per cent. Garages and service stations and general truckers were next in line with 6.7 and 6.2 per cent respectively.

Ford to Set Up New Parts Center in California

More West Coast expansion by the Ford Motor Co. was disclosed with the announcement that the company is negotiating with the Santa Fe Railway Co. for the lease of a 137,000-sq ft warehouse and 9300-sq ft office to provide for automobile service parts in the Richmond Calif. district. Located in Permanente Shipyard No. 2, the proposed facilities will house about $3 million worth of service parts. All Ford parts for the Richmond district will be stocked, plus some slow moving parts now carried at Salt Lake City, Seattle, and Long Beach. Some Lincoln, Mercury and transit bus parts will also be stocked in the new parts depot. Ford expects to be operating in the new warehouse within 30 to 60 days after the lease is signed.

20 Million Tons of Steel Lost in Strikes

Total steel lost as a result of strikes since the beginning of 1946 is equal to the total tonnage used by the automobile industry in 1946 and 1947, according to the American Iron & Steel Institute. Included in the total are more than 1.6 million tons of ingots lost in March, April, and May of this year because of the coal strike in the spring. Total tonnage lost during the two-year period is estimated at 20 million tons.

Elect Mason Chairman of Nash Board

George W. Mason, president of Nash-Kelvinator Corp., has been elected chairman of the board. He succeeds Charles W. Nash, founder of the company, who died June 6 at the age of 84. Mr. Mason will continue as president in addition to his duties as board chairman.

(*Turn to page 98, please*)

GET COSTS DOWN

"Out of the Air"

and put a fresh breeze behind sales...

...the way Air Conditioners do it with AMERICAN PHILLIPS SCREWS

DEFLATE COSTS . . . like one of the largest refrigerator and air conditioner manufacturers . . . who says: "Our present high production would not have been possible without American Phillips Screws . . . *which permitted the efficient use of power drivers.*" And which *did not permit* any more driver skids, spoiled work, dropped screws, burred screw heads, slashed hands. Now, labor costs keep in line, as do material costs. And time savings run as much as 50%.

INFLATE SALES with the modern, inviting look of American Phillips Screws. The clean-edged, tapered recess flashes the message of quality *instantly* to the buyer's eye. And remember, too, that in any motorized merchandise, the special vibration-resistance of American Phillips Screws has a lot to do with *keeping customers sold.* Let American engineers translate these Phillips advantages *in specific terms of your own product.* Write.

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

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AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

General News

(*Continued from page* 96)

Appoint Fleming Mfg. V. P. of Chrysler Div.

A. M. Fleming has been appointed vice president in charge of manufacturing of the Chrysler Div. The appointment is a promotion from the position of general works manager that he has held for the past 11 years. He will be succeeded as general works manager by Fred A. Wunderlich, who has been associated with Chrysler since that company was founded in 1924, and with Chalmers and Maxwell, predecessors of the Chrysler Corp., for several years prior to that.

Leading Engine Co. Formed in Detroit

The latest entry in the industrial engine field in Detroit is the Leading Engine Co. which expects to get into production this month on small air-cooled industrial engines. The firm will build a new type low powered engine developing 1.5 and 2.5 horsepower. It is built 80 per cent of aluminum and has a weight of 34 lb.

K-F Sales Rise Sharply Since April

Kaiser-Frazer sales, which were in the doldrums the early part of this year, have bounded up sharply since April. The company's orders increased 118 per cent in the last six months, and orders for July delivery were 2.5 times the best possible production for the month, indicating that unfilled orders for July alone would approximate 30,000. Cars in dealers hands have also declined greatly since March and now average less than two a dealer.

Electro-Motive to Make Diesels in Australia

The Electro-Motive Div. of GM has concluded an agreement with the Clyde Engineering Co. of Australia for the manufacture of diesel locomotives in that country. The Clyde works at Granville, New South Wales will be used for the project.

Canada's Taxes Hit New Car Buyers Hard

Tax conscious automobile buyers in the United States really have little to complain about when they look at the excise and sales tax imposed by Canada on the purchase of new automobiles. For example, the price of a new Ford deluxe coupe built by Ford of Canada, Ltd., exclusive of freight and delivery charges, is $1450. However, the addition of $389 in excise and sales taxes brings the total to $1839. The new Meteor line, which replaces the old Mercury 114 and is sold by Lincoln-Mercury dealers, is priced at $1504, plus $408 excise and sales taxes. The following prices show factory list, excise and sales taxes and total:

Model	Factory List	Excise and Sales Taxes	Total
FORD			
Deluxe Tudor	$1525	$419	$1944
Deluxe Fordor	1595	452	2047
Deluxe Club Coupe	1570	440	2010
Custom Tudor	1595	452	2047
Custom Fordor	1665	484	2149
Custom Club Coupe	1640	473	2113
METEOR (less delivery charges)			
Deluxe Tudor	1575	442	2017
Deluxe Fordor	1645	475	2120
Deluxe Club Coupe	1620	463	2083
Custom Tudor	1645	475	2120
Custom Fordor	1715	507	2222
Custom Club Coupe	1690	496	2186

Name Newill Vice President of General Motors

E. B. Newill, general manager of GM's Allison Div. has been elected a vice president of the corporation. He has been with GM since 1929, and was made general manager of the Allison div. in 1923.

Dr. George W. Lewis

Dr. George W. Lewis, 66, former director of aeronautical research, National Advisory Committee for Aeronautics, died on July 12, in Lake Winola, Pa.

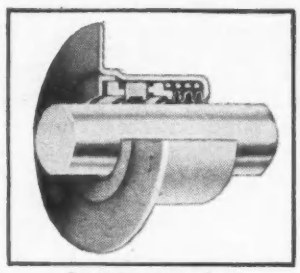
New Cartridge Seal Solves Rotating Shaft Sealing Problems

Stepped-up efficiency in sealing of rotating shafts can now be accomplished with a new Cartridge-type Seal mounted on the shaft.

The Cartridge-type Seal shown above is mounted within a Tuthill Pump. The seal contains all parts in one housing cup and insures positive double sealing. A high grade permanent lubricant is contained within the inside chamber of the housing.

Surfaces within the Cartridge-type Seal are lapped flat to within a few millionths of an inch to insure perfect mating. And, being a complete unit, only one mounting face is necessary. Clamps are eliminated, and adjustments or alignments are not required. Simply push the Cartridge-type Seal onto the shaft, tighten mounting screws and that's all.

Just as new engineering developments increase efficiency and performance, so can workers' efficiency be increased through the use of chewing gum. The act of chewing helps relieve nervous tension, thus helping to make the work go smoother and easier. That's why plant owners everywhere more and more are making Wrigley's Spearmint Chewing Gum available to all.



Cartridge-type Seal

Complete information may be obtained from
Cartriseal Corporation
200 No. Laflin Street Chicago 7, Illinois

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